PSMN1R2-25YL

N-channel 25 V 1.2 mΩ logic level MOSFET in LFPAK

Rev. 01 — 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 converters
- 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		-	-	25	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; $V_{sup} \leq 25$ V; R_{GS} = 50 Ω; unclamped		-	-	677	mJ
Dynamic characteristics							
Q_{GD}	gate-drain charge	V_{GS} = 4.5 V; I_D = 25 A; V_{DS} = 12 V; see Figure 12; see Figure 13		-	11.9	-	nC
$Q_{G(tot)}$	total gate charge			-	50.6	-	nC

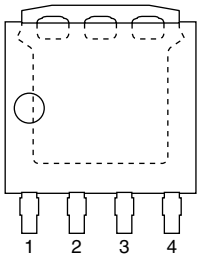
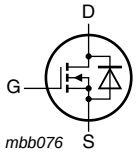
Table 1. Quick reference *…continued*

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 11	-	-	1.6	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 25 °C; see Figure 10	-	0.9	1.2	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	drain		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PSMN1R2-25YL	LFPAK2	Plastic single-ende surface-mounted package (LFPAK2); 4 leads	SOT1023

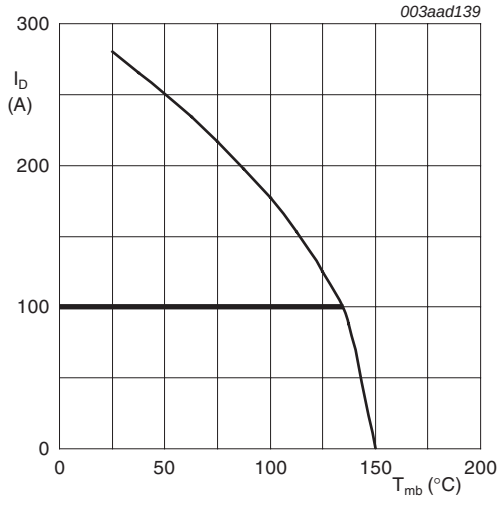
4. Limiting values

Table 4. Limiting values

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

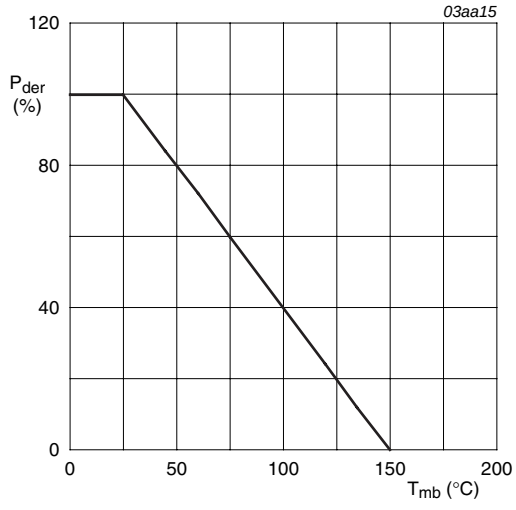
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C		-	25	V
V_{DGR}	drain-gate voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C; R_{GS} = 20 kΩ		-	25	V
V_{GS}	gate-source voltage			-20	20	V
I_D	drain current	V_{GS} = 10 V; T_{mb} = 100 °C; see Figure 1	[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		-	815	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		-	815	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; $V_{sup} \leq 25$ V; R_{GS} = 50 Ω; unclamped		-	677	mJ

[1] Continuous current is limited by package.



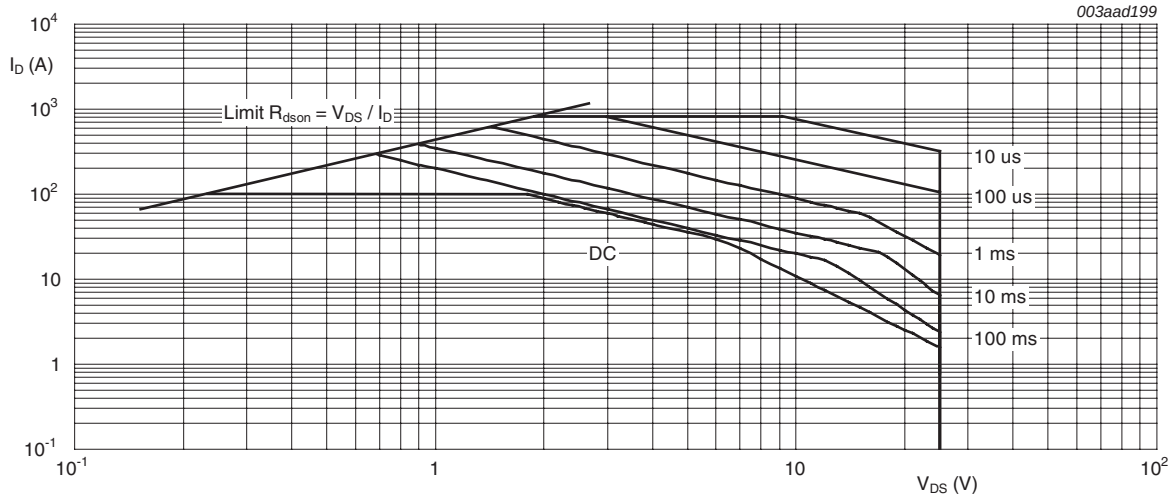
$V_{GS} \geq 5V(1)$ Capped at 100A due to package

Fig 1. Continuous drain current 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



$T_{sp} = 25\,°C; I_{DM}$ is single pulseCapped at 100A due to package

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	K/W

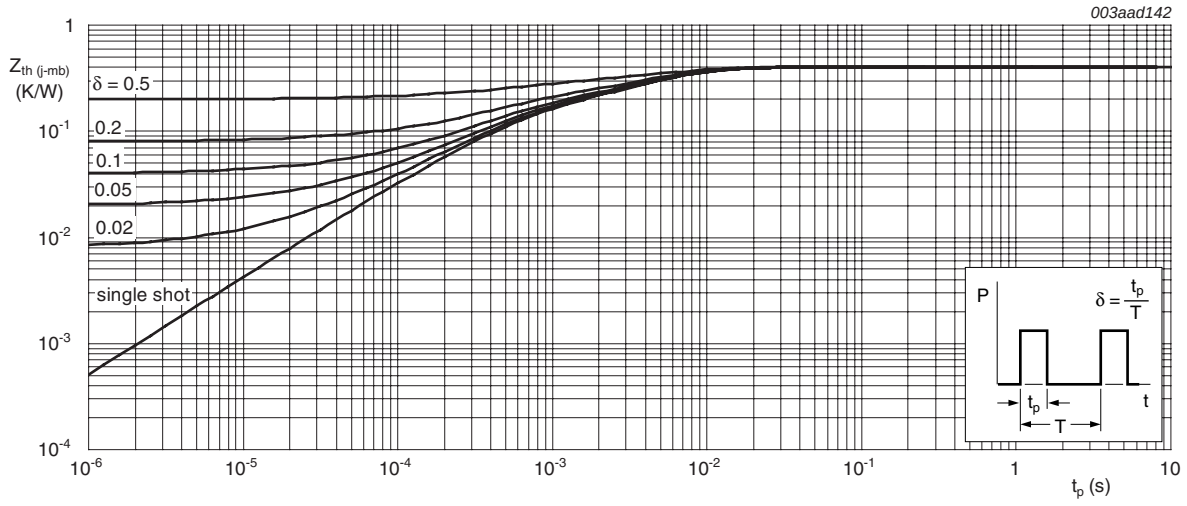


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

6. Characteristics

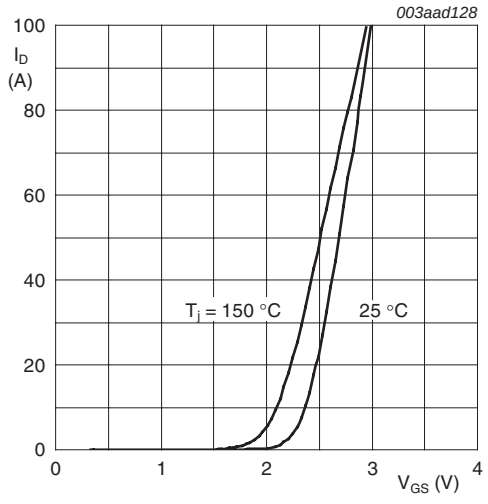
Table 6. Characteristics

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	25	-	-	V
		I_D = 250 µA; V_{GS} = 0 V; T_j = -55 °C	22	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 °C; see Figure 8; see Figure 9	1.3	1.7	2.15	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 150 °C; see Figure 9	0.65	-	-	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 °C; see Figure 9	-	-	2.45	V
I_{DSS}	drain leakage current	V_{DS} = 25 V; V_{GS} = 0 V; T_j = 25 °C	-	-	1.5	µA
		V_{DS} = 25 V; V_{GS} = 0 V; T_j = 150 °C	-	-	500	µA
I_{GSS}	gate leakage current	V_{GS} = 16 V; V_{DS} = 0 V; T_j = 25 °C	-	-	100	nA
		V_{GS} = -16 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 10	-	1.2	1.85	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 100 °C; see Figure 11	-	-	1.6	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 150 °C; see Figure 11	-	-	2.1	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 25 °C; see Figure 10	-	0.9	1.2	mΩ
R_G	gate resistance	f = 1 MHz	-	0.94	-	Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	I_D = 25 A; V_{DS} = 12 V; V_{GS} = 10 V; see Figure 12; see Figure 13	-	105	-	nC
		I_D = 25 A; V_{DS} = 12 V; V_{GS} = 4.5 V; see Figure 12; see Figure 13	-	50.6	-	nC
Q_{GS}	gate-source charge	I_D = 25 A; V_{DS} = 12 V; V_{GS} = 4.5 V; see Figure 12; see Figure 13	-	19.3	-	nC
$Q_{GS(th)}$	pre-threshold gate-source charge		-	8.1	-	nC
$Q_{GS(th-pl)}$	post-threshold gate-source charge		-	4.5	-	nC
Q_{GD}	gate-drain charge		-	11.9	-	nC
$V_{GS(pl)}$	gate-source plateau voltage	V_{DS} = 12 V; see Figure 12	-	2.6	-	V
C_{iss}	input capacitance	V_{DS} = 12 V; V_{GS} = 0 V; f = 1 MHz; T_j = 25 °C; see Figure 14	-	6380	-	pF
C_{oss}	output capacitance		-	1640	-	pF
C_{rss}	reverse transfer capacitance		-	644	-	pF

Table 6. Characteristics *…continued*

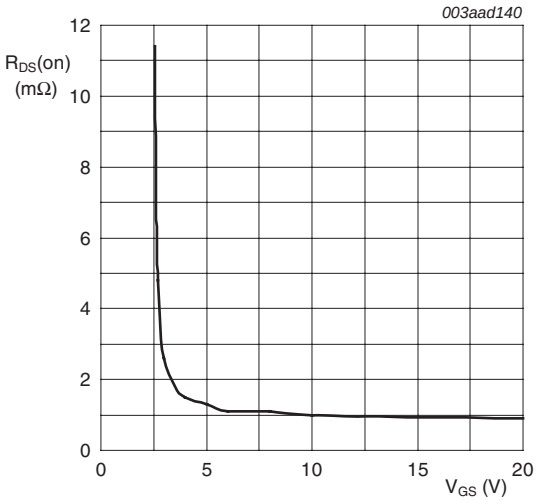
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	turn-on delay time	V_{DS} = 12 V; R_L = 0.5 Ω; V_{GS} = 4.5 V; $R_{G(ext)}$ = 5.6 Ω	-	69	-	ns
t_r	rise time		-	125	-	ns
$t_{d(off)}$	turn-off delay time		-	94	-	ns
t_f	fall time		-	56	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	I_S = 25 A; V_{GS} = 0 V; T_j = 25 °C; see Figure 15	-	0.78	1.2	V
t_{rr}	reverse recovery time	I_S = 20 A; dI_S/dt = -100 A/µs; V_{GS} = 0 V; V_{DS} = 20 V	-	52	-	ns
Q_r	recovered charge		-	66	-	nC

[1] Tested to JEDEC standards where applicable.



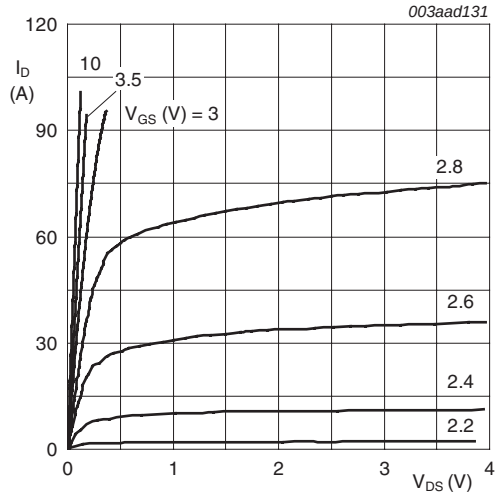
$V_{DS} = 10V$

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



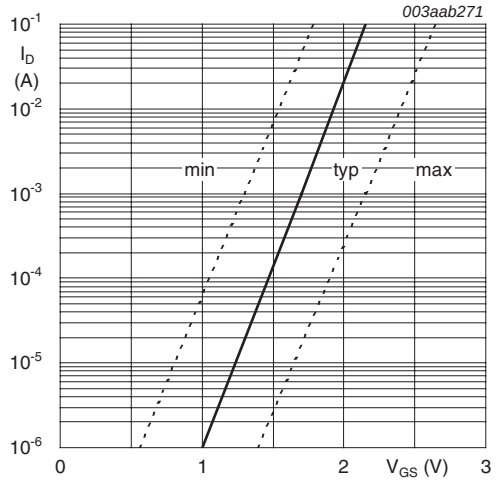
$T_j = 25\,°C; I_D = 15A$

Fig 6. Drain-source on-state resistance as a function of gate-source voltage; typical values



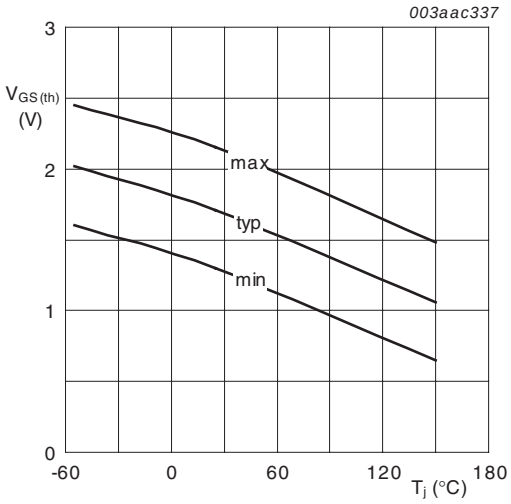
$T_j = 25\,°C;\ t_p = 300\,\mu s$

Fig 7. Output characteristics: drain current as a function of drain-source voltage; typical values



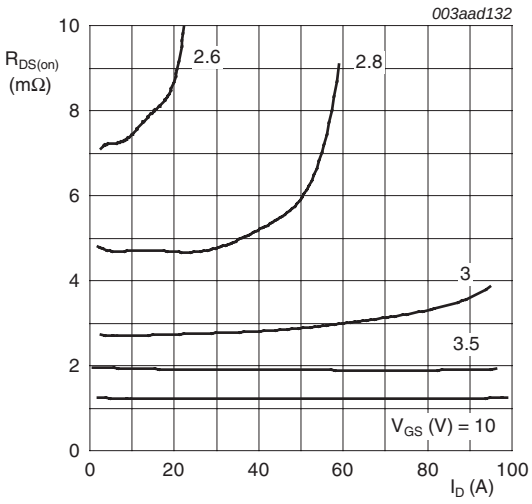
$T_j = 25\,°C; V_{DS} = 5\,V$

Fig 8. Sub-threshold drain current as a function of gate-source voltage



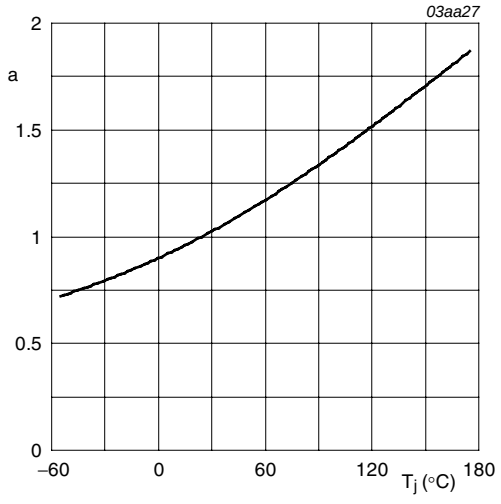
$I_D = 1\,mA; V_{DS} = V_{GS}$

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



$T_j = 25\,°C;\ t_p = 300\,\mu s$

Fig 10. Drain-source on-state resistance as a function of drain current; typical values



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

Fig 11. Normalized drain-source on-state resistance factor as a function of junction temperature

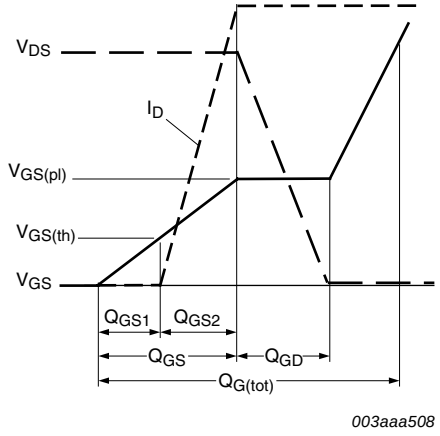
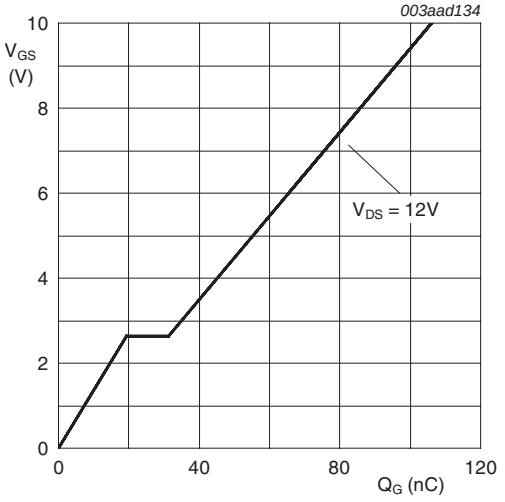
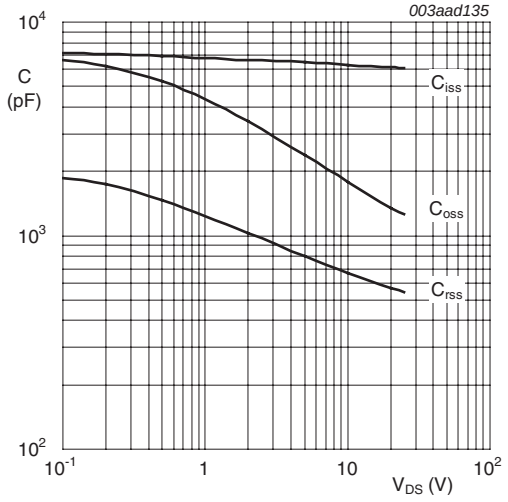


Fig 12. Gate charge waveform definitions



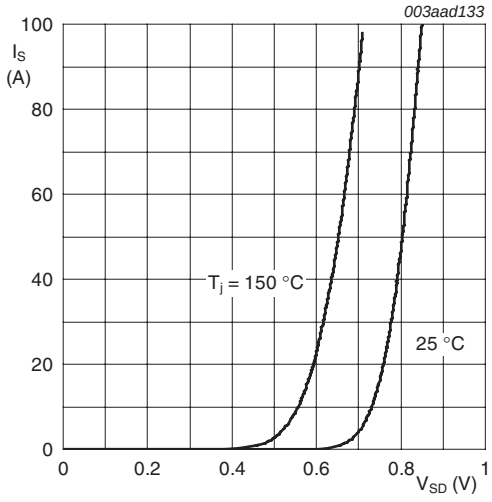
$$T_j = 25\,°C; I_D = 10\,A$$

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



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

Fig 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

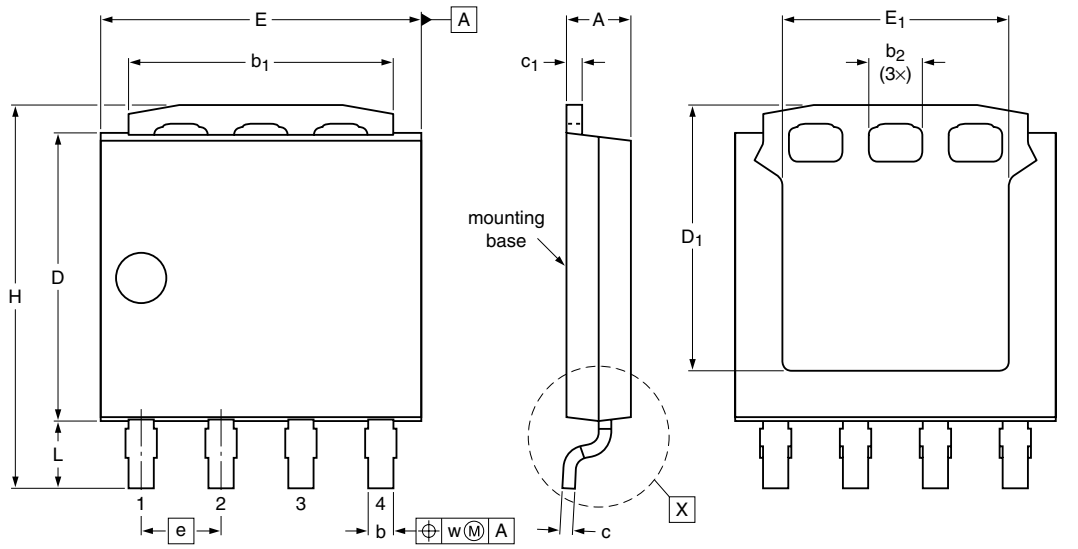


$V_{GS} = 0\,V$

Fig 15. Source (diode forward) current as a function of source-drain (diode forward) voltage; 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 16. Package outline SOT1023

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PSMN1R2-25YL_1	20090625	Product 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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For more information, please visit: http://www.nxp.com

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

11. Contents

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

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Document identifier: PSMN1R2-25YL_1

PSMN1R2-25YL

Preview Product information Selection guide

Datasheet

(Product Specification)
v.1.0, 2009-06-25
Pages, 213kB

Download datasheet
Download all documentation

N-channel 25 V 1.2 mΩ logic level MOSFET in LFPAK

General description

Hide

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.

Back to top

Features and benefits

Hide

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

Back to top

Applications

Hide

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

Back to top

Quick reference

Hide

Symbol	Parameter	Conditions	Min	Typ/Nom	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C			25	V
I_D	drain current	$T_{mb} = 25$ °C; $V_{GS} = 10$ V			100	A
P_{tot}	total power dissipation	$T_{mb} = 25$ °C			121	W
T_j	junction temperature		-55		150	°C
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10$ V; $I_D = 15$ A; $T_j = 100$ °C			1.6	mΩ
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10$ V; $I_D = 15$ A; $T_j = 25$ °C		0.9	1.2	mΩ
Dynamic characteristics						
Q_{GD}	gate-drain charge	$V_{GS} = 4.5$ V; $I_D = 25$ A; $V_{DS} = 12$ V		11.9		nC
$Q_{G(tot)}$	total gate charge	$V_{GS} = 4.5$ V; $I_D = 25$ A; $V_{DS} = 12$ V		50.6		nC
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; $V_{sup} \leq 25$ V; $R_{GS} = 50$ Ω; unclamped			677	mJ

Back to top

Similar Products

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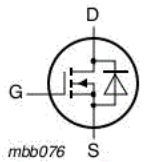
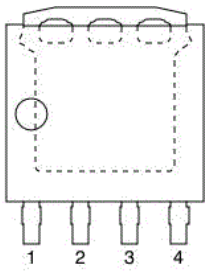
Back to top

Pinning information

Hide

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source		
2	S	source		
3	S	source		
4	G	gate		

[0]

mb	D	drain	

Back to top

Pricing/ordering/availability Hide

Type number	Ordering code (12NC)	Orderable part number	Region	Distributor	In stock	Order quantity	Inventory date	Buy online	Samples
PSMN1R2-25YL	9340 638 12115	PSMN1R2-25YL,115	NA	DIGI-KEY CORPORATION	8,990		3/4/2011	Buy online	Order samples
			NA	DIGI-KEY CORPORATION	7,500		3/4/2011	Buy online	
			AS	ARROW ASIA PAC LTD	1,500		3/6/2011	Buy online	
			NA	WPG AMERICAS INC.	1,500		3/4/2011	Buy online	
			NA	MOUSER ELECTRONICS	256		3/5/2011	Buy online	
			NA	MOUSER ELECTRONICS	256		3/5/2011	Buy online	
			NA	AVNET ELECTRONICS MARKETING	200		3/7/2011	Buy online	
			EU	FARNELL	21		3/7/2011	Buy online	

Back to top

Products/packages Hide

Type number	Orderable part number	Ordering code (12NC)	Product status	Package	Packing	Marking	ECCN
PSMN1R2-25YL	PSMN1R2-25YL,115	9340 638 12115	Volume production	SOT1023 (LFPAK)	Tape reel smd	Standard Marking	

Back to top

Quality/reliability/chemical content Hide

Type number	Orderable part number	Chemical content	RoHS	Leadfree conversion date	RHF	IFR (FIT)	MTBF (hours)	MSL	MSL LF
PSMN1R2-25YL	PSMN1R2-25YL,115	PSMN1R2-25YL	EU RoHS COMPLIANT		H			1	1

Quality and reliability disclaimer

Back to top

Design support Hide

Application note
Power MOSFET single-shot and repetitive avalanche ruggedness rating (v.2.1, 2010-03-17)
LFPAK MOSFET thermal design guide (v.2.0, 2011-01-27)

Leaflet
25 V to 100 V MOSFETs in Power-SO8 (v.1.0, 2010-01-13)

Selection guide
Power MOSFET Selection guide 2010 (v.2.3, 2010-06-29)

SPICE model
PSMN1R2-25YL SPICE model (v.1.0, 2010-03-17)

Thermal model
PSMN1R2-25YL Thermal model (v.2.0, 2009-07-01)

Back to top

Print/email Hide

Email this product information
Print this product information

Back to top

Disclaimers Hide

General product disclaimer
Quality and reliability disclaimer