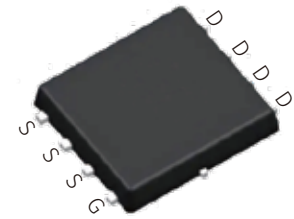


## FEATURES

- | Advanced trench cell design
- | Low Thermal Resistance



PDFN3×3-8L

## APPLICATION

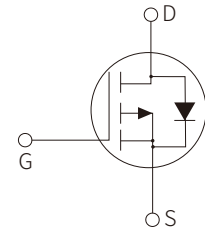
- | Motor Drivers
- | DC - DC Converter



Marking

## APPROVALS

RoHS	Compliance with 2011/65/EU
HF	Compliance with IEC61249-2-21:2003



Schematic Symbol

## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Drain-Source Voltage $T_c=25^\circ\text{C}$	$V_{DS}$	-40	V
Pulsed Source Current $T_c=25^\circ\text{C}, V_{GS}=-10\text{V}$	$I_{DM}^{***}$	-120	A
Drain Current $V_{GS}=-10\text{V}$	$T_c=25^\circ\text{C}$	-40	A
	$T_c=100^\circ\text{C}$	-19	A
Gate-Source Voltage $T_c=25^\circ\text{C}$	$V_{GS}$	$\pm 20$	V
Total Power Dissipation $T_c=25^\circ\text{C}$	$P_{tot}^*$	20	W
Diode Forward Current $T_c=25^\circ\text{C}$	$I_S$	-40	A
Junction Temperature	$T_J$	-55 to 150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 to 150	$^\circ\text{C}$
Single Pulsed Avalanche Energy $V_{DD}=-40\text{V}, L=1\text{ mH}$	$E_{AS}^*$	210	mJ
Thermal Resistance- Junction to Case	$R_{\theta JC}^*$	6	$^\circ\text{C}/\text{W}$

Notes:

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10$  sec

\*\* Pulse width  $\leq 300$  us, duty cycle  $\leq 2\%$ 

\*\*\* Limited by bonding wire

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-40			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =-250μA	-1		-3	V
Zero Gate Voltage Source Current	I <sub>DSS</sub>	V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V			-1	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
Drain-Source On-State Resistance	R <sub>DS(on)</sub> <sup>a</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A		8	10	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A		10	12	mΩ
<b>Diode Characteristics</b>						
Diode Forward Voltage	V <sub>SD</sub> <sup>a</sup>	I <sub>SD</sub> =-15A, V <sub>GS</sub> =0V			-1.3	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>SD</sub> =-15A, dI <sub>SD</sub> /dt=100A/μs		17		nS
Reverse Recovery Charge	Q <sub>rr</sub>			12		nC
<b>Dynamic Characteristics<sup>b</sup></b>						
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-20V, Frequency = 1 MHz		3351		pF
Output capacitance	C <sub>oss</sub>			300		pF
Reverse transfer capacitance	C <sub>rss</sub>			270		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =-20V, V <sub>GEN</sub> =-10V R <sub>G</sub> =3.9Ω, R <sub>L</sub> =1.33Ω, I <sub>D</sub> =-15A		95		nS
Turn-on Rise Time	t <sub>r</sub>			3.5		nS
Turn-Off Delay Time	t <sub>d(off)</sub>			34		nS
Turn-Off Fall Time	t <sub>f</sub>			3		nS
<b>Gate Charge Characteristics<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =-10V, I <sub>DS</sub> =-15A		77		nC
Gate-Source Charge	Q <sub>gs</sub>			7		nC
Gate-Drain Charge	Q <sub>gd</sub>			16		nC

**Notes:**

a : Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2 %

b : Guaranteed by design, not subject to production testing

# PARAMETER CHARACTERISTIC CURVE

Figure1: Power Capability

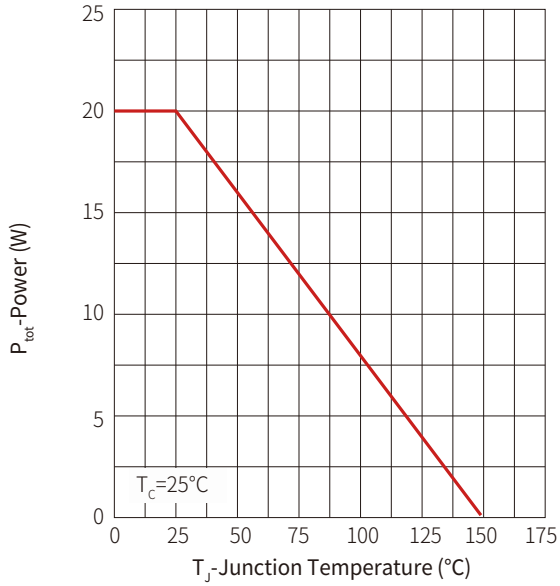


Figure2: Current Capability

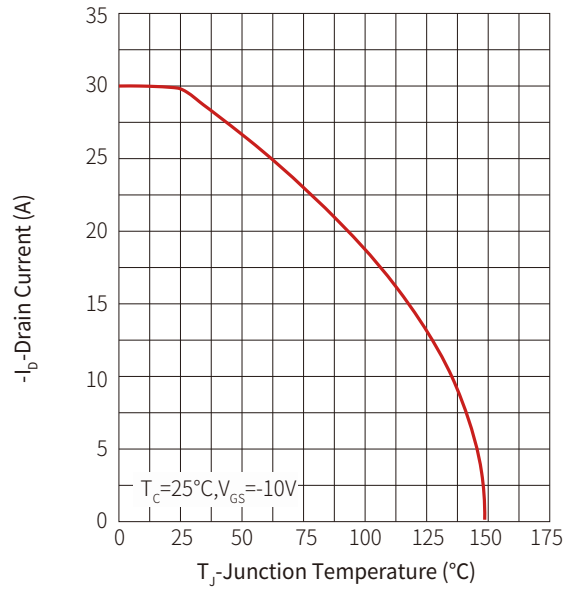


Figure3: Safe operating Area

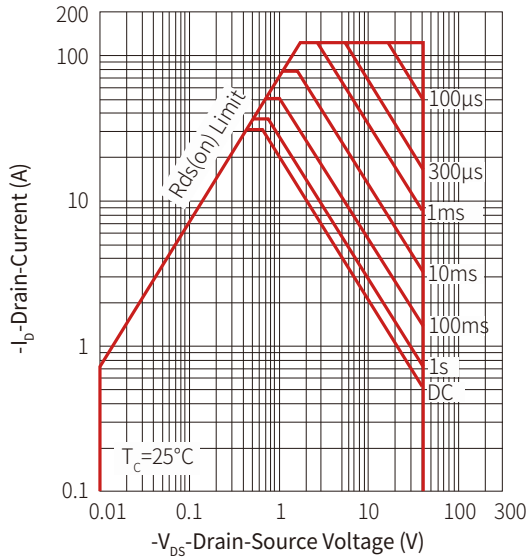
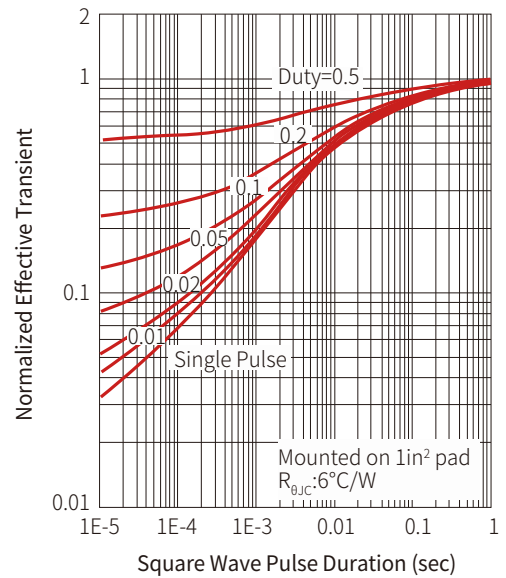
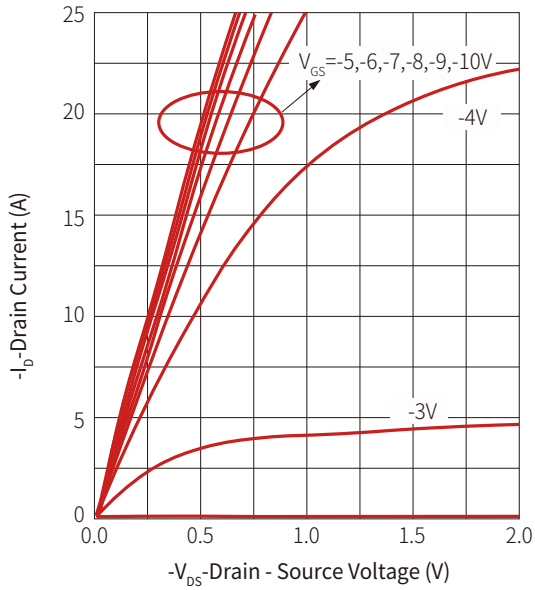


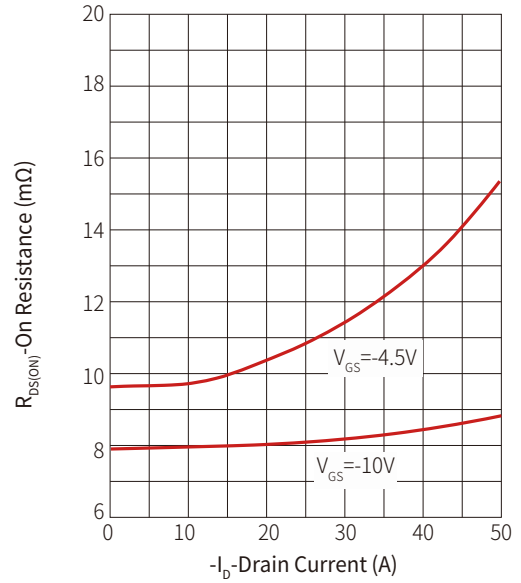
Figure 4: Transient Thermal Impedance



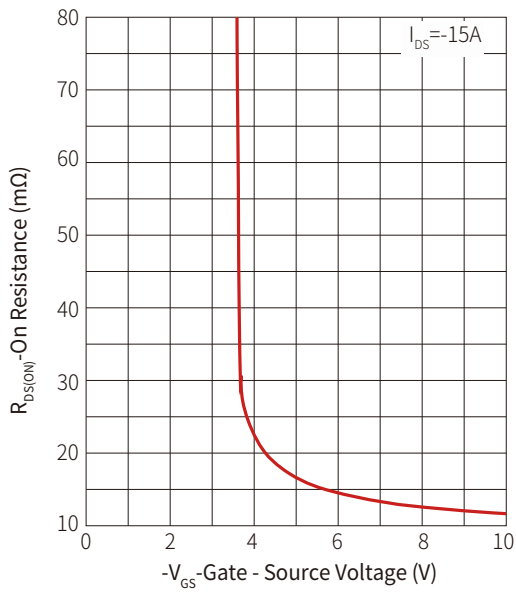
**Figure 5: Output Characteristics**



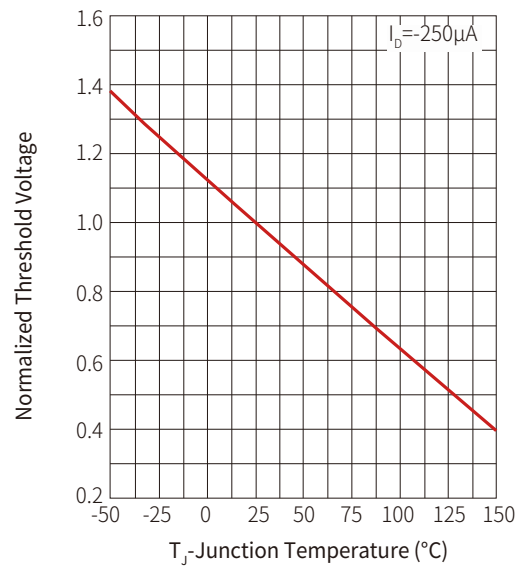
**Figure 6: Drain-Source On Resistance**



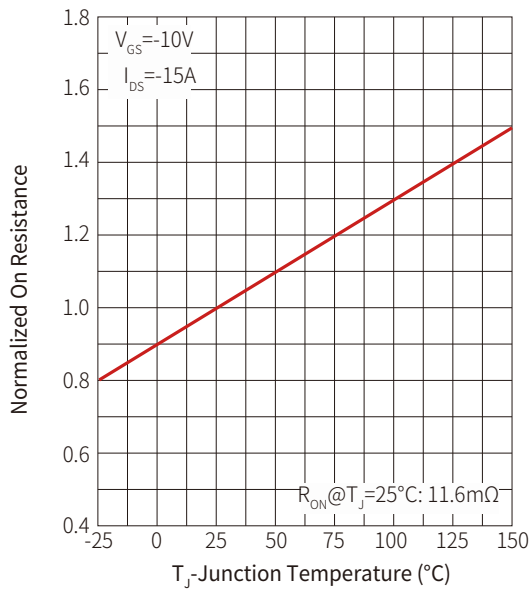
**Figure 7: Transfer Characteristics**



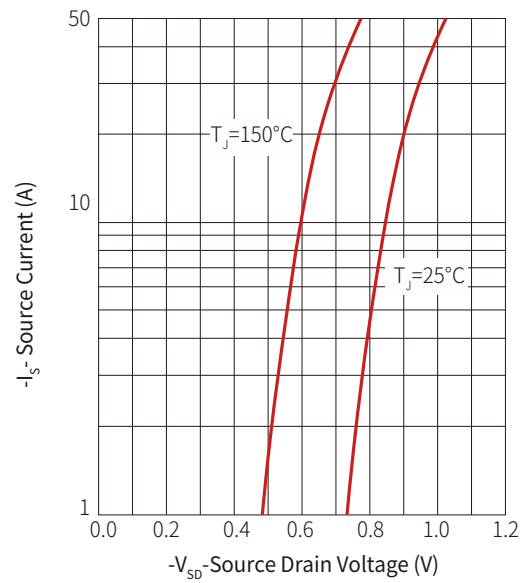
**Figure 8: Normalized Threshold Voltage**



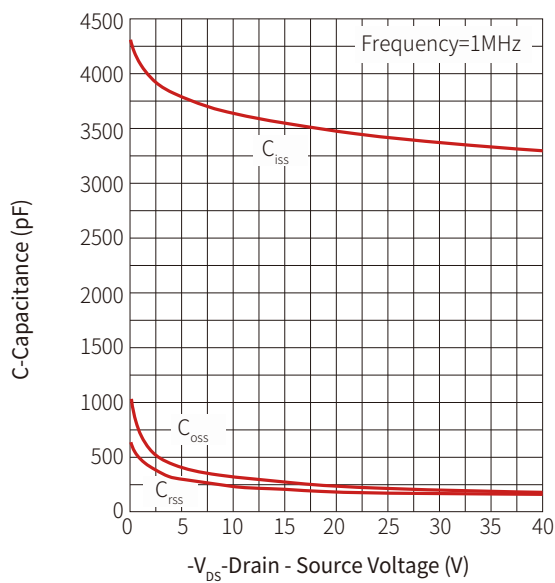
**Figure 9: Normalized On Resistance**



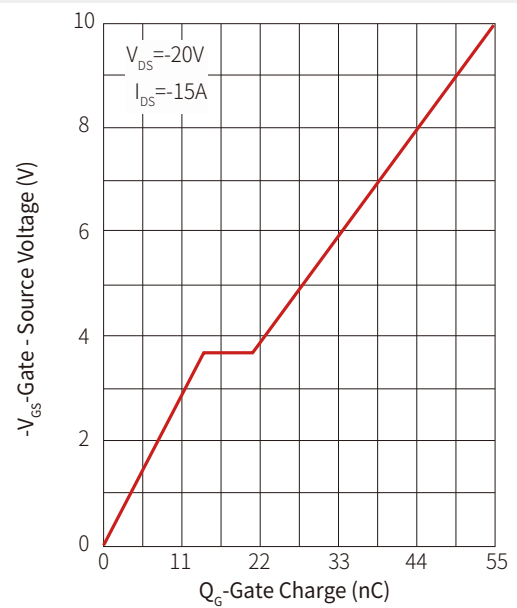
**Figure 10: Diode Forward Current**



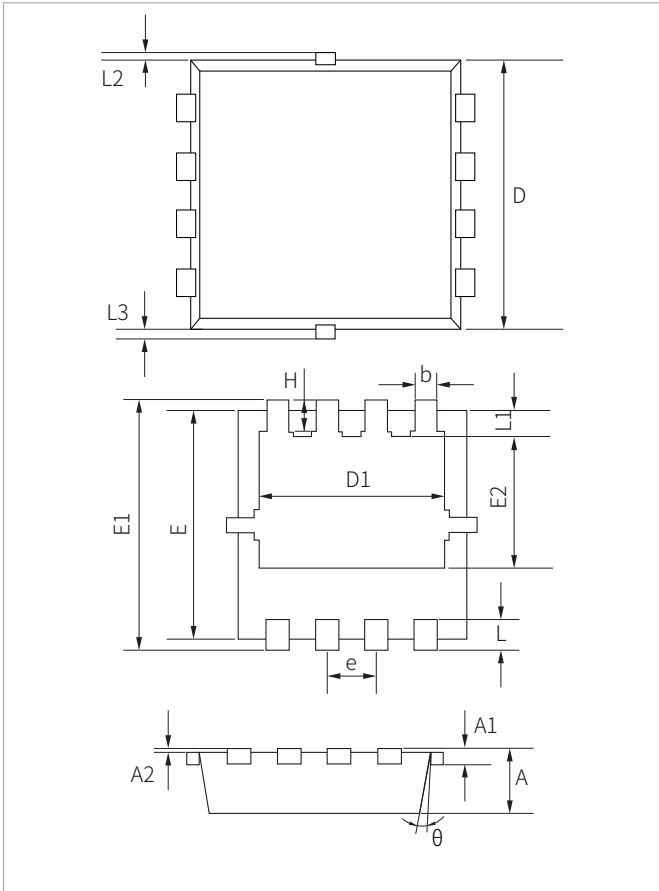
**Figure 11: Capacitance**



**Figure 12: Gate Charge**



## PDFN3x3-8L PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152REF		0.006REF	
A2	0~0.05		0~0.002	
D	2.900	3.300	0.114	0.130
D1	2.250	2.650	0.089	0.104
E	2.900	3.300	0.114	0.130
E1	3.150	3.550	0.124	0.140
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°

## ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
SPM40P04Q	PDFN3x3-8L	5000PCS	13"

**Headquarters**

No.3387 Shendu Road  
Pujiang I&E Park  
Minhang Shanghai China  
201000

**Hotline**

400-021-5756

**Web**

<https://www.semiware.com>

**Sales Center**

Tel: 86-21-3463-7458  
Email: [sales18@semiware.com](mailto:sales18@semiware.com)

**Customer Service**

Tel: 86-21-5484-1001  
Email: [sales17@semiware.com](mailto:sales17@semiware.com)

**Technical Support**

Tel: 86-21-3463-7654  
Email: [fae01@semiware.com](mailto:fae01@semiware.com)

**Complaint & Suggestions**

Tel: 86-21-3463-7172  
Ext: 8868  
Email: [cs03@semiware.com](mailto:cs03@semiware.com)

**By QR Code**

Website



Wechat

To find your local partner within Semiware' s global website: [www.semiware.com](http://www.semiware.com)

© 2022 Semiware Semiconductor Inc.

The content of this document has been carefully checked and understood. However, neither Semiware nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Semiware does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Chinese law and resulting disputes shall be settled by the courts at the place of business of Semiware. Latest publications and a complete disclaimer can be downloaded from the Semiware website. All trademarks recognized.