

#### Product Summary

BVDSS	RDSON_Max	ID
-20V	14mΩ@10V	-30A

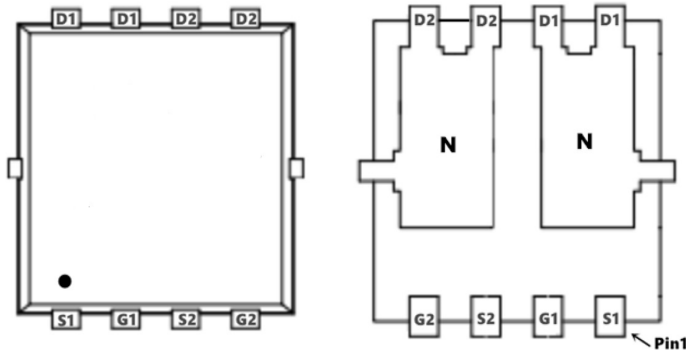
#### Features

- ❖ Advanced Trench MOSFET
- ❖ Technology 100% EAS Guaranteed
- ❖ Green Device Available

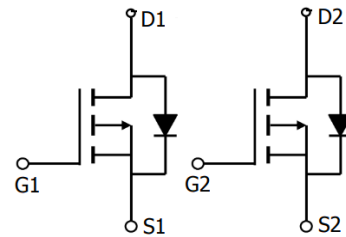
#### Application

- ❖ Lithium battery protection
- ❖ Wireless impact
- ❖ Mobile phone fast charging

PDFN3333-D



#### EQUIVALENT CIRCUIT



#### Absolute Maximum Rating (Ta=25°C)

Parameter	Symbol	Limit	Unit
Drain-source voltage	$V_{DS}$	-20	V
Gate-source voltage	$V_{GS}$	±12	V
Continuous drain current ( $V_{GS}=-4.5V$ ) <sup>(1)</sup>	$I_D$	-30	A
	$I_D$	-19	A
Pulsed drain current <sup>(2)</sup>	$I_{D,pulse}$	-90	A
Power dissipation	$P_D$	1.5	W
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to 150	°C

#### Thermal Characteristic (Ta=25°C)

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient <sup>(3)</sup>	$R_{\theta JA}$	--	85	°C/W
Thermal Resistance, Junction-to-Case <sup>(3)</sup>	$R_{\theta JC}$	--	13	°C/W

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
Off characteristics							
Drain-source breakdown voltage	V <sub>(BR) DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA		-20			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V	T <sub>J</sub> =25 ℃			-1.0	μA
			T <sub>J</sub> =125 ℃			-100	
Gate-body leakage current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V				±100	nA
On characteristics ⑤							
Gate-threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA		-0.45	-0.65	-0.9	V
Static drain-source on-sate resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A			10.2	14	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-10A			12.5	15	
Dynamic characteristics ⑤⑥							
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-10V,V <sub>GS</sub> =0V, f =1MHz			1900		pF
Output capacitance	C <sub>oss</sub>				232		
Reverse transfer capacitance	C <sub>rss</sub>				228		
Gate resistance	R <sub>g</sub>	f =1MHz			9.1		Ω
Switching characteristics ⑤⑥							
Total gate charge	Q <sub>g</sub>	V <sub>GS</sub> =-4.5V,V <sub>DS</sub> =-10V, I <sub>D</sub> =-8A			14.7		nC
Gate-source charge	Q <sub>gs</sub>				2.1		
Gate-drain charge	Q <sub>gd</sub>				4.9		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =-10V,R <sub>L</sub> =1Ω, V <sub>GS</sub> =-4.5V, R <sub>GEN</sub> =3.3Ω			9.5		ns
Turn-on rise time	t <sub>r</sub>				33		
Turn-off delay time	t <sub>d(off)</sub>				24		
Turn-off fall time	t <sub>f</sub>				9		
Drain-Source Diode Characteristics							
Drain-source diode forward voltage	V <sub>SD</sub> ⑤	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A				-1.2	V
Continuous drain-source diode forward current	I <sub>S</sub> ①					-20	A
Pulsed drain-source diode forward current	I <sub>SM</sub> ②					-48	A

Notes:

 1. T<sub>C</sub> = 25 °C Limited only by maximum temperature allowed.

 2. P<sub>W</sub> ≤ 10μs, Duty cycle ≤ 1%.

 3. EAS condition: V<sub>DD</sub> = 15V, V<sub>GS</sub> = 10V, L = 0.5mH, R<sub>g</sub> = 25Ω Starting T<sub>J</sub> = 25 °C.

 4. EAS condition: V<sub>DD</sub> = -15V, V<sub>GS</sub> = -10V, L = 0.5mH, R<sub>g</sub> = 25Ω Starting T<sub>J</sub> = 25 °C.

5. Pulse Test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.

6. Guaranteed by design, not subject to production.

 7. The value of RθJA is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub> = 25 °C. t ≤ 10sec.

## Typical Characteristics

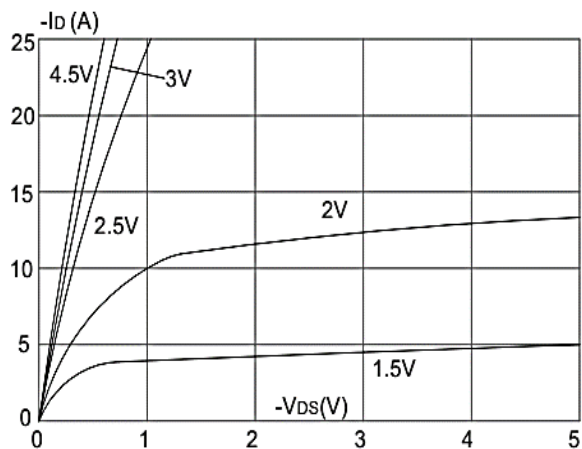


Figure 1: Output Characteristics

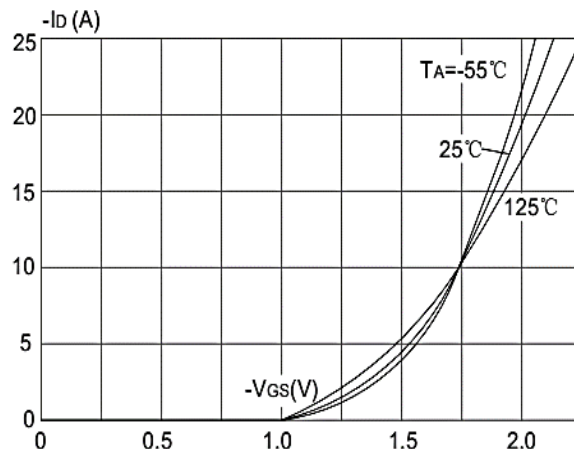


Figure 2: Typical Transfer Characteristics

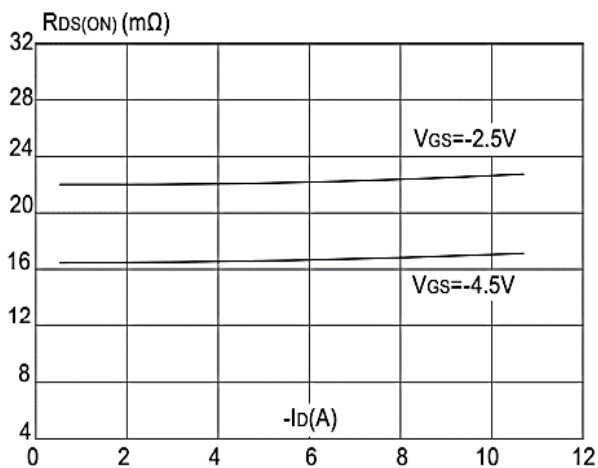


Figure 3: On-resistance vs. Drain Current

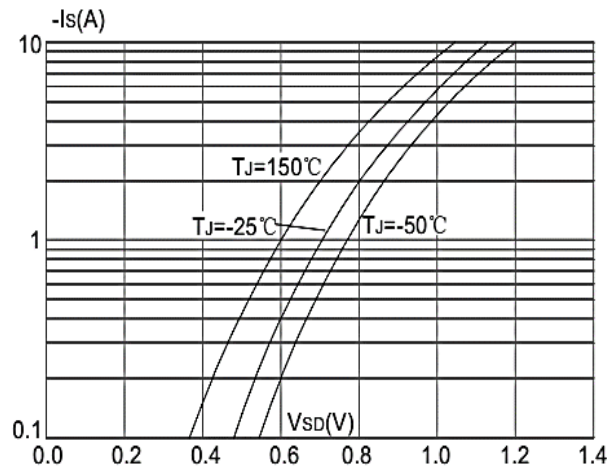


Figure 4: Body Diode Characteristics

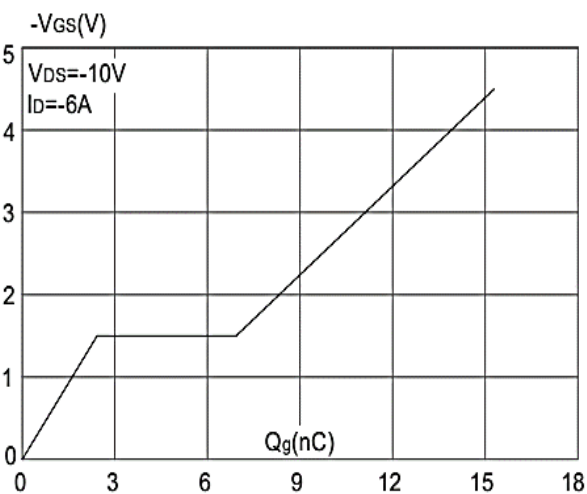


Figure 5: Gate Charge Characteristics

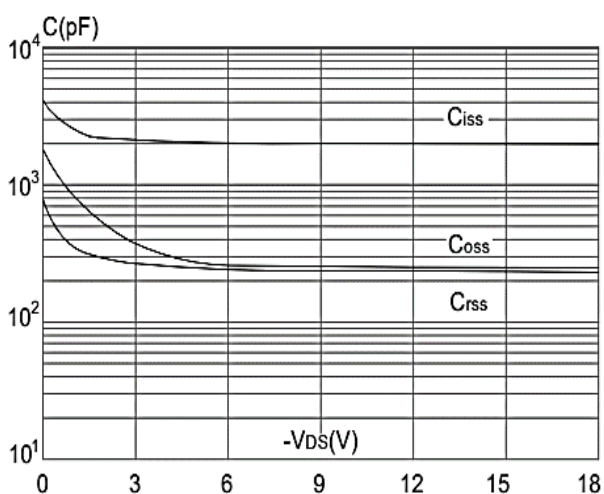
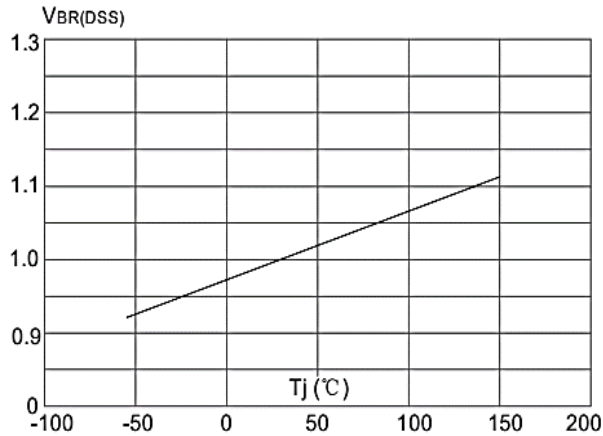
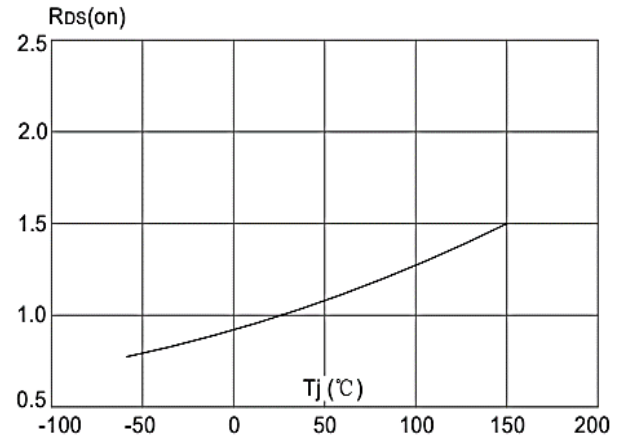


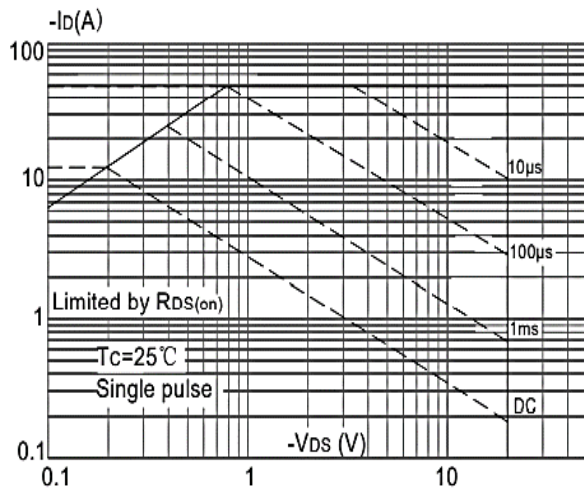
Figure 6: Capacitance Characteristics



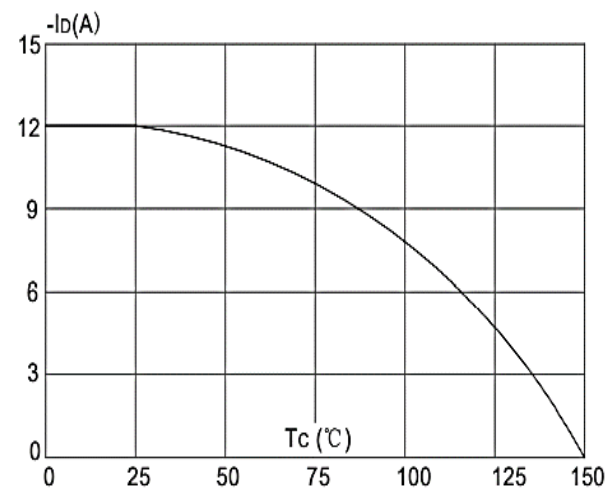
**Figure 7: Normalized Breakdown Voltage vs Junction Temperature**



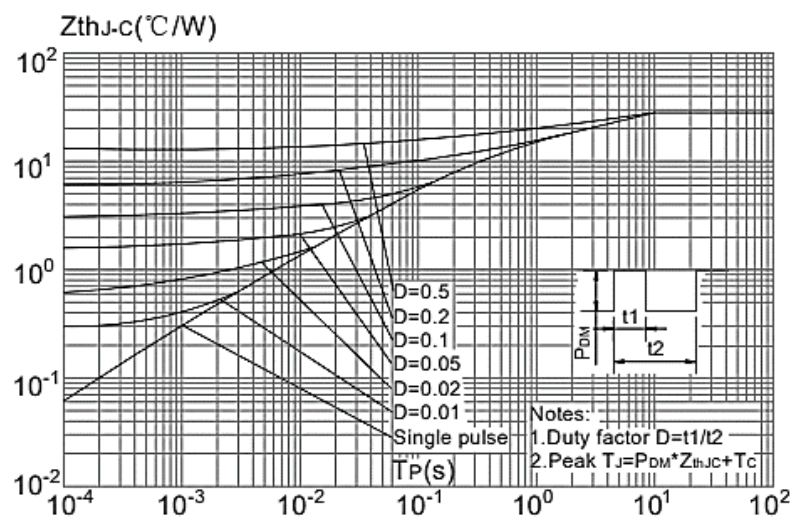
**Figure 8: Normalized on Resistance vs. Junction Temperature**



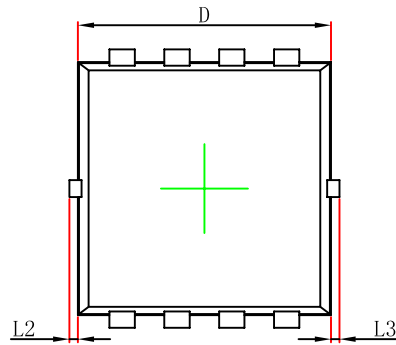
**Figure 9: Maximum Safe Operating Area**



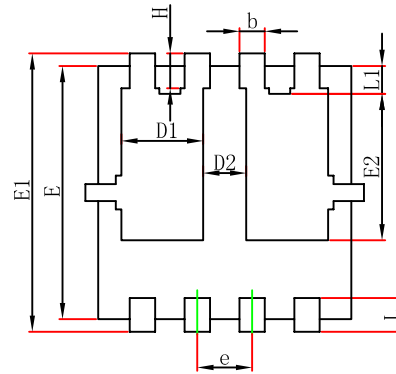
**Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature**



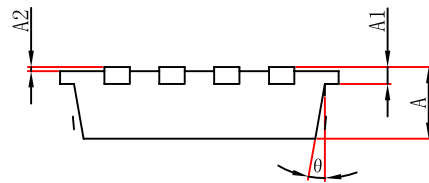
**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien**

**Outline Drawing PDFN3333-D**


Top View  
[顶视图]



Bottom View  
[背视图]



Side View  
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	0.935	1.135	0.037	0.045
D2	0.280	0.480	0.011	0.019
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
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°

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