

N-Channel Enhancement Mode Power MOSFET

**General Description**

The D4884 is the highest performance trench N-ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charges for most of the synchronous buck converter applications .

The D4884 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

**Applicatio**

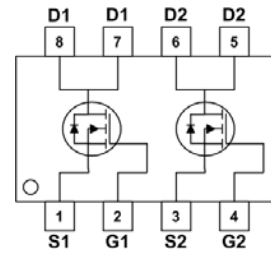
- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

**Features**

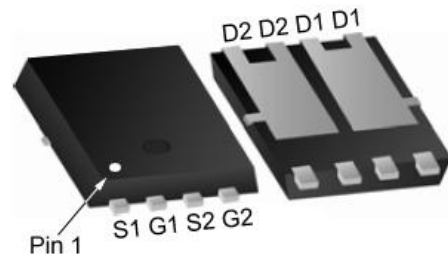
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

**Product Summary**

BVDSS	RDSON	ID
30V	15 mΩ	28A



**Schematic diagram**



**PDFN3333-8 top view**

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	28	A
I <sub>D</sub> @T <sub>C</sub> =70°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	15	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	50	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	23	mJ
I <sub>AS</sub>	Avalanche Current	9	A
P <sub>D</sub> @T <sub>A</sub> =25°C	Total Power Dissipation <sup>4</sup>	2.0	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-ambient <sup>1</sup>	---	40	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	25	°C/W



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	30	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =9 A	---	15	18	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =7A	---	19	23	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	1.2	2.1	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =28V , V <sub>GS</sub> =0V , T <sub>J</sub> =25℃	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V , I <sub>D</sub> =9A	---	30	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	3.6	---	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =15V , V <sub>GS</sub> =4.5V , I <sub>D</sub> =9 A	---	8.9	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.5	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.8	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V , V <sub>GEN</sub> =10V , R <sub>G</sub> =6Ω I <sub>D</sub> =1A, R <sub>L</sub> =15Ω	---	6	8.8	ns
T <sub>r</sub>	Rise Time		---	8.2	14	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	16	24	
T <sub>f</sub>	Fall Time		---	4	8	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V , V <sub>GS</sub> =0V , f=1MHz	---	650	---	pF
C <sub>oss</sub>	Output Capacitance		---	65	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	57	---	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =25V , L=0.5mH , I <sub>AS</sub> =9A	18	---	---	mJ

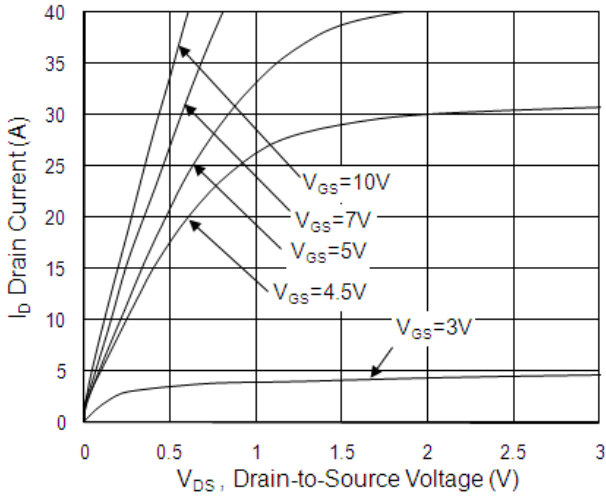
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	2	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	50	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>S</sub> =2.3A , T <sub>J</sub> =25℃	---	---	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =9A , di/dt=100A/μs , T <sub>J</sub> =25℃	---	6	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	3.9	---	nC

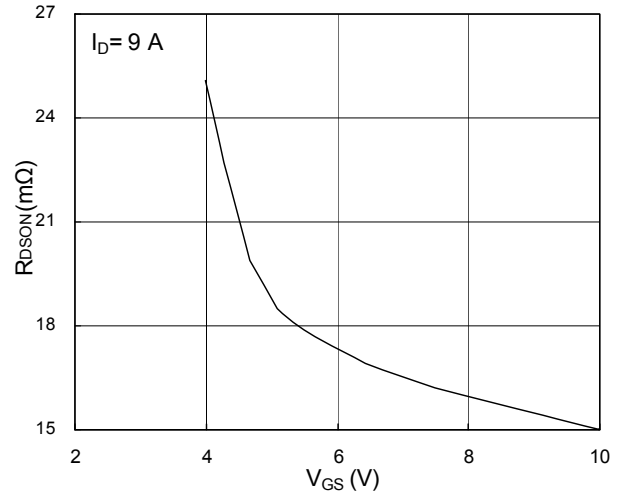
Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper,t<10sec.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.5mH,I<sub>AS</sub>=9A
- 4.The power dissipation is limited by 150℃ junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

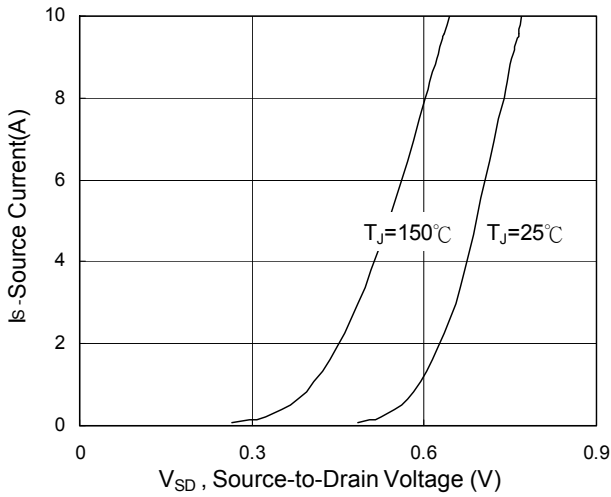
**Typical Characteristics**



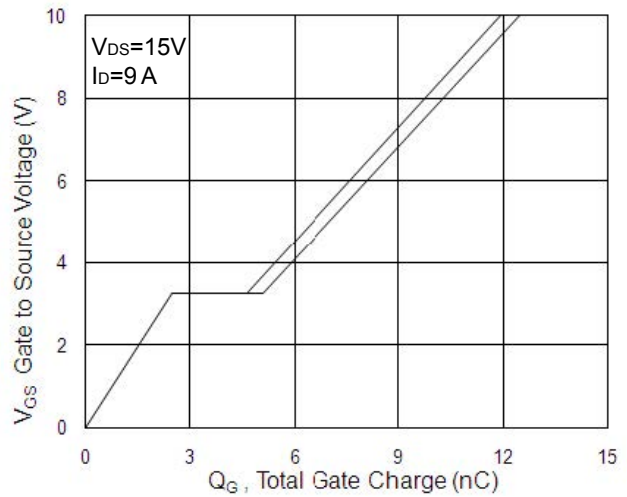
**Fig.1 Typical Output Characteristics**



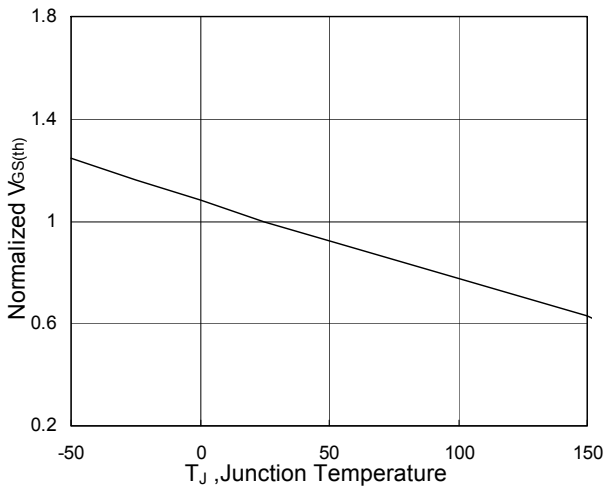
**Fig.2 On-Resistance vs. G-S Voltage**



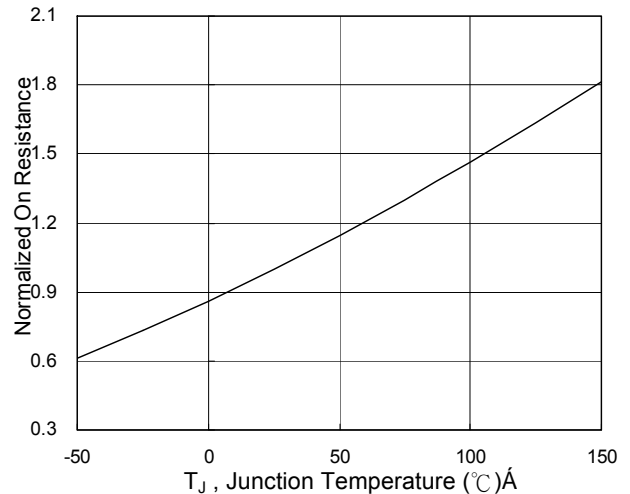
**Fig.3 Forward Characteristics Of Reverse**



**Fig.4 Gate-Charge Characteristics**



**Fig.5 Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>**



**Fig.6 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**

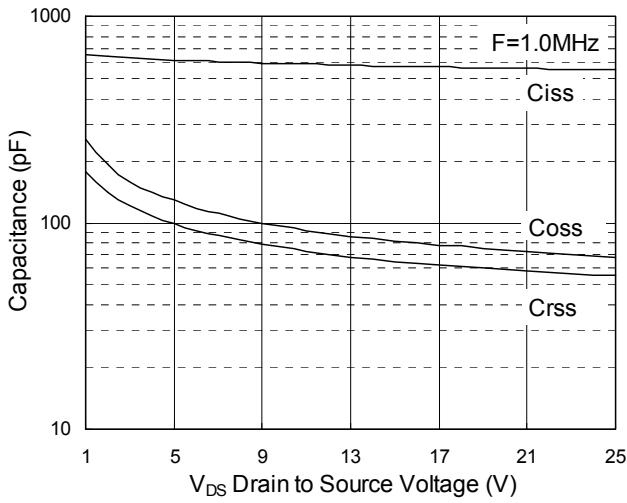


Fig.7 Capacitance

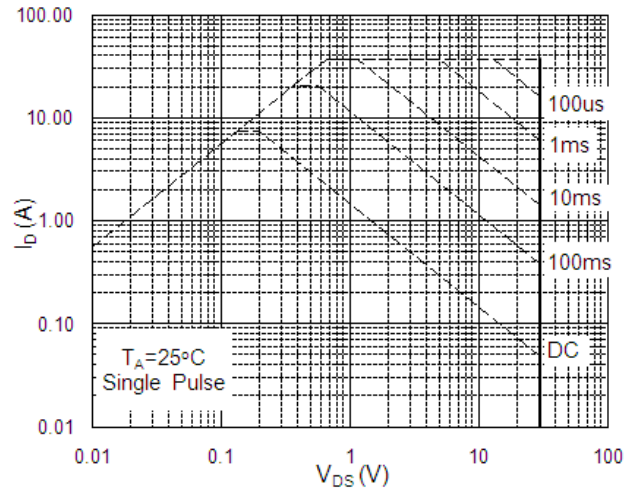


Fig.8 Safe Operating Area

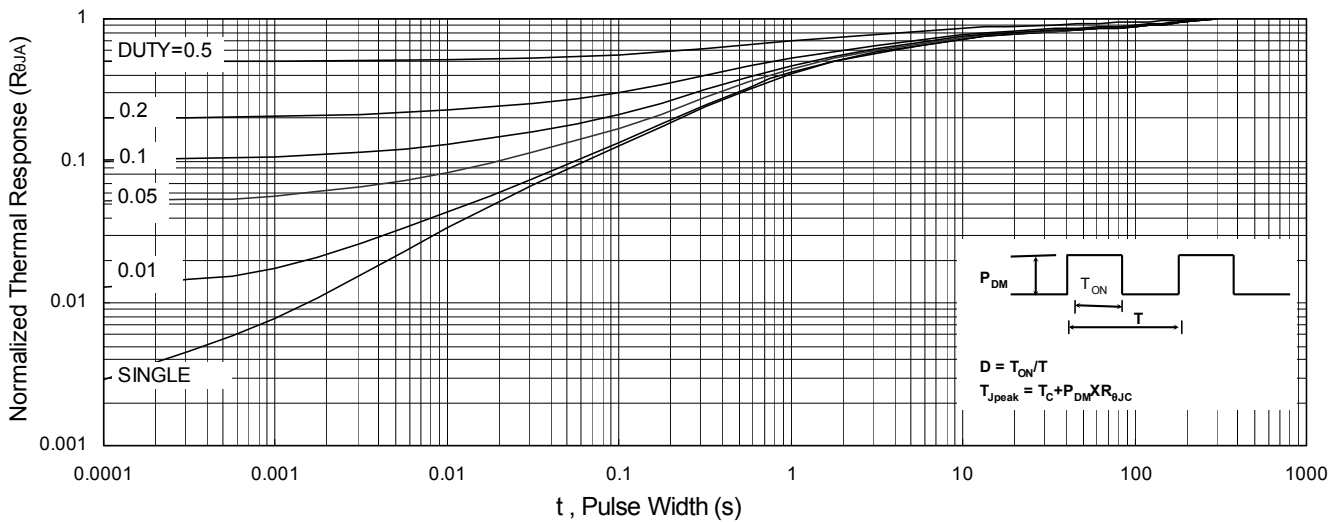


Fig.9 Normalized Maximum Transient Thermal Impedance

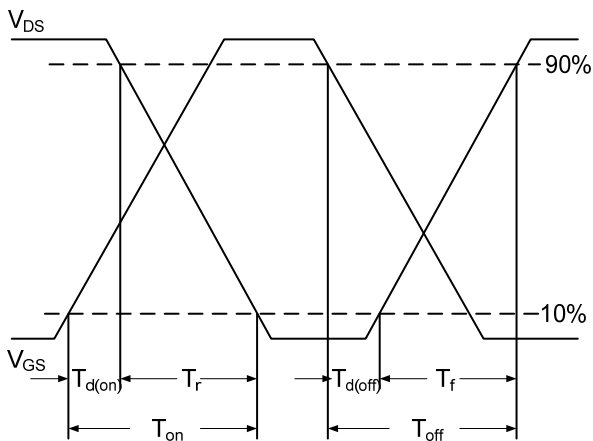


Fig.10 Switching Time Waveform

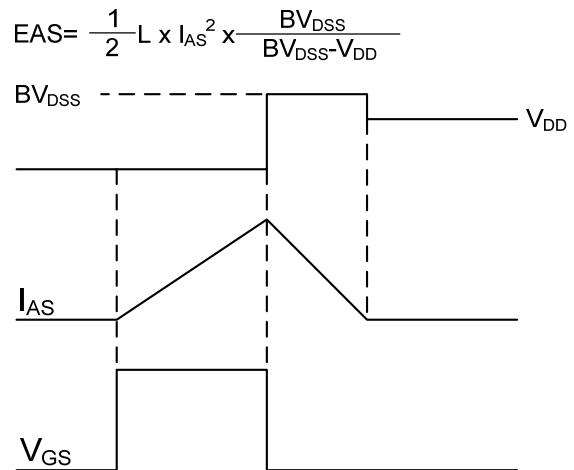
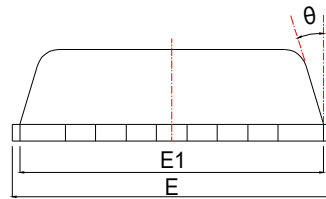
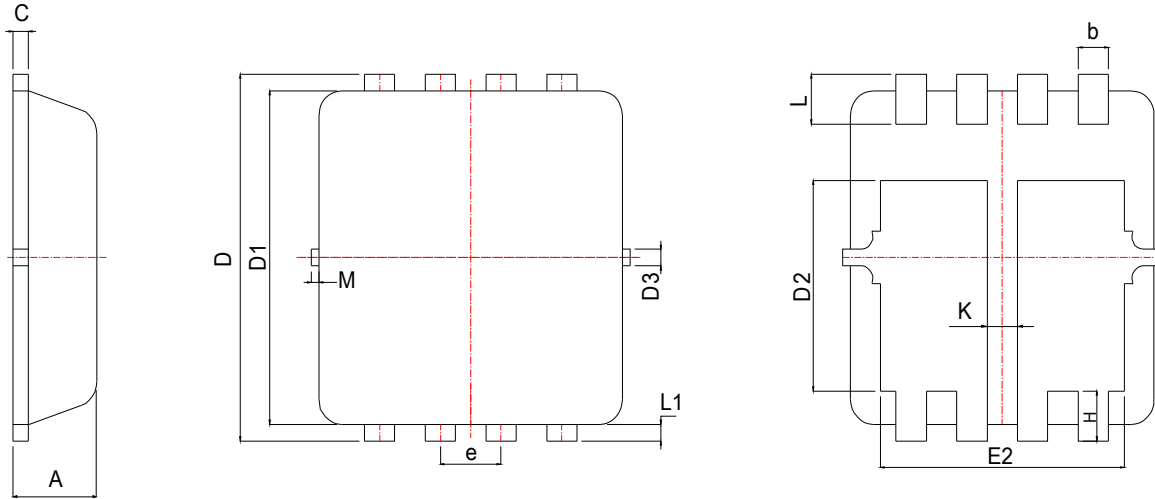
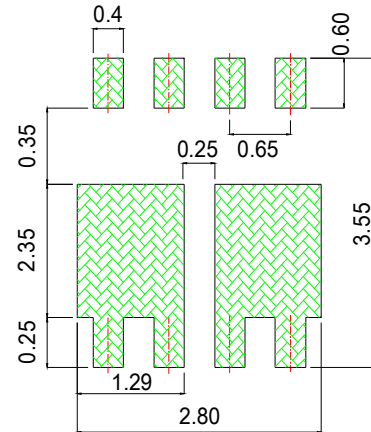


Fig.11 Unclamped Inductive Switching Waveform

PDFN3333



Land Pattern (Only for Reference)



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031	E1	3.00	3.15	3.20	0.118	0.122	0.126
b	0.25	0.30	0.35	0.010	0.012	0.014	E2	2.39	2.49	2.59	0.094	0.098	0.102
c	0.10	0.15	0.25	0.004	0.007	0.010	e	0.65BSC			0.026BSC		
D	3.25	3.35	3.45	0.128	0.132	0.136	H	0.30	0.40	0.50	0.012	0.016	0.020
D1	3.00	3.10	3.20	0.118	0.122	0.126	L	0.30	0.40	0.50	0.012	0.016	0.020
D2	1.78	1.88	1.98	0.070	0.074	0.078	L1	*	0.13	*	*	0.005	*
D3	*	0.13	*	*	0.005	*	θ	*	10°	12°	*	10°	12°
E	3.20	3.30	3.40	0.126	0.130	0.134	M	*	*	0.15	*	*	0.006
K	0.30	*	*	0.012	*	*							