

# **MDD4N25**

## N-Channel MOSFET 250V, 3.0A, 1.75Ω

### General Description

The MDD4N25 uses advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

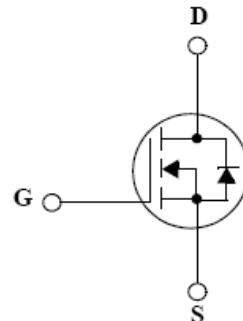
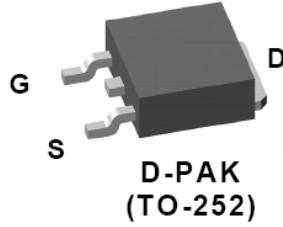
MDD4N25 is suitable device for SMPS, HID and general purpose applications.

### Features

- $V_{DS} = 250V$
- $I_D = 3.0A$
- $R_{DS(ON)} \leq 1.75\Omega$  @  $V_{GS} = 10V$

### Applications

- Power Supply
- PFC
- LED TV



### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		$V_{DSS}$	250	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	$T_C=25^\circ C$	$I_D$	3.0	A
	$T_C=100^\circ C$		1.9	A
Pulsed Drain Current <sup>(1)</sup>		$I_{DM}$	12	A
Power Dissipation	$T_C=25^\circ C$	$P_D$	37	W
	Derivate above 25 °C		0.29	W/°C
Peak Diode Recovery $dv/dt$ <sup>(3)</sup>		$dv/dt$	5.5	V/ns
Repetitive Pulse Avalanche Energy <sup>(4)</sup>		$E_{AR}$	3.7	mJ
Avalanche current <sup>(1)</sup>		$I_{AR}$	3.0	A
Single Pulse Avalanche Energy <sup>(4)</sup>		$E_{AS}$	52	mJ
Junction and Storage Temperature Range		$T_J, T_{stg}$	-55~150	°C

### Thermal Characteristics

Characteristics		Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient <sup>(1)</sup>		$R_{θJA}$	110	°C/W
Thermal Resistance, Junction-to-Case <sup>(1)</sup>		$R_{θJC}$	3.4	

## Ordering Information

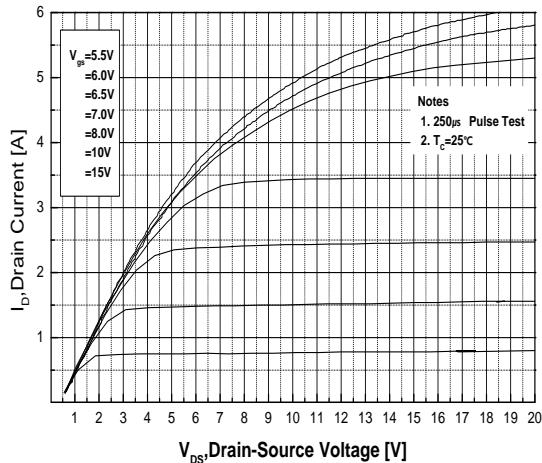
Part Number	Temp. Range	Package	Packing	RoHS Status
MDD4N25RH	-55~150°C	D-PAK	Reel and Tape	Halogen Free

## Electrical Characteristics (Ta =25°C)

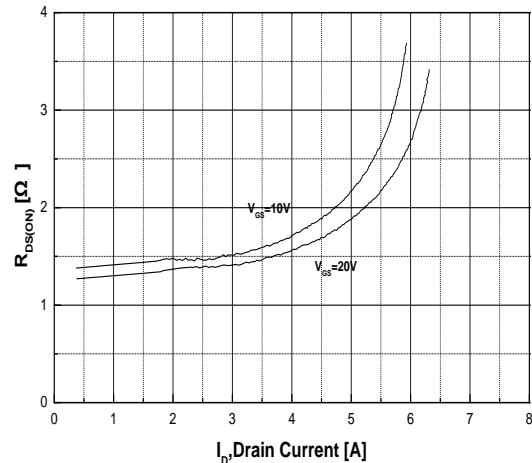
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = 250µA, V <sub>GS</sub> = 0V	250	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA	3.0	-	5.0	
Drain Cut-Off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 250V, V <sub>GS</sub> = 0V	-	-	1	µA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V	-	-	100	nA
Drain-Source ON Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.5A		1.38	1.75	Ω
Forward Transconductance	g <sub>f</sub>	V <sub>DS</sub> = 30V, I <sub>D</sub> = 1.5A	-	1.7	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 200V, I <sub>D</sub> = 3.6A, V <sub>GS</sub> = 10V	-	4.2	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1.35	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	1.95	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz	-	146	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	3	-	
Output Capacitance	C <sub>oss</sub>		-	32	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = 5V, V <sub>DS</sub> = 125V, I <sub>D</sub> = 3.6A, R <sub>G</sub> = 25Ω	-	8	-	ns
Rise Time	t <sub>r</sub>		-	21	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	5	-	
Fall Time	t <sub>f</sub>		-	16	-	
<b>Drain-Source Body Diode Characteristics</b>						
Maximum Continuous Drain to Source Diode Forward Current	I <sub>S</sub>	I <sub>S</sub> = 3.0A, V <sub>GS</sub> = 0V	-	-	3.0	A
Source-Drain Diode Forward Voltage	V <sub>SD</sub>		-	-	1.5	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>		-	110	-	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>		-	0.34	-	µC

Note :

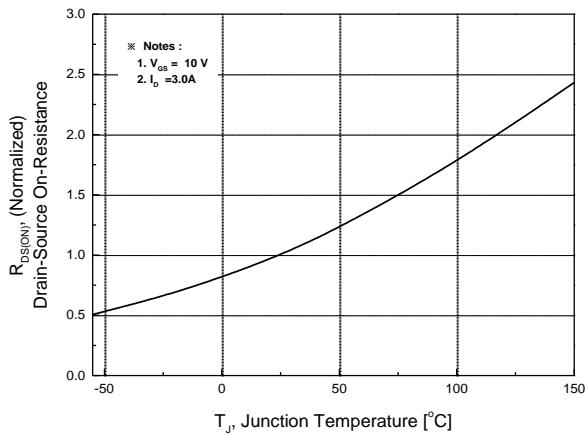
1. Pulse width is based on R<sub>ESC</sub> & R<sub>SLA</sub> and the maximum allowed junction temperature of 150°C.
2. Pulse test: pulse width ≤300us, duty cycle≤2%, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
3. I<sub>SD</sub>≤3.6A, di/dt≤300A/us, V<sub>DD</sub>≤BV<sub>DSS</sub>, R<sub>g</sub>=25Ω, Starting T<sub>J</sub>=25°C
4. L=9.3mH, I<sub>S</sub>=3.0A, V<sub>DD</sub>=50V, R<sub>g</sub>=25Ω, Starting T<sub>J</sub>=25°C



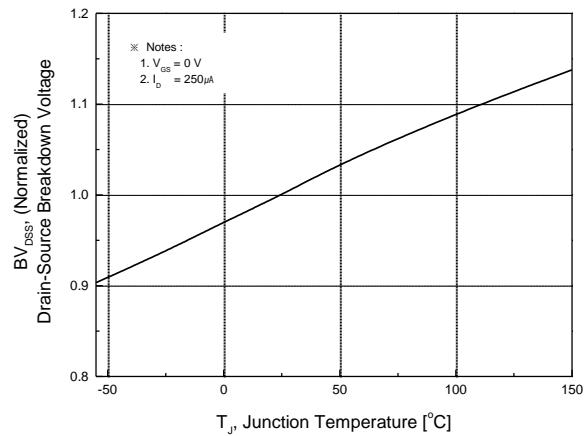
**Fig.1 On-Region Characteristics**



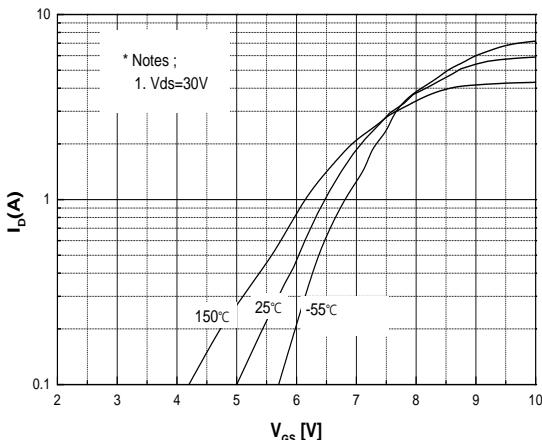
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



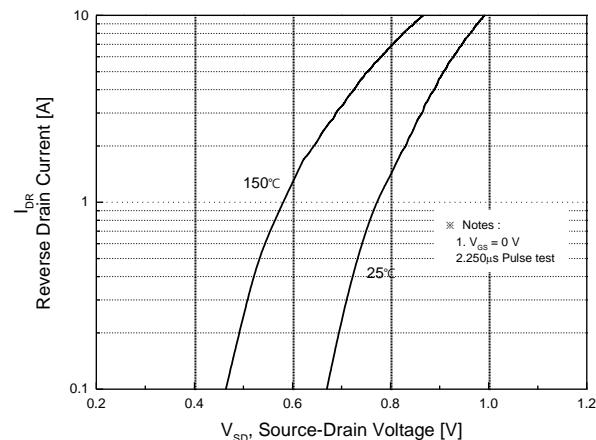
**Fig.3 On-Resistance Variation with Temperature**



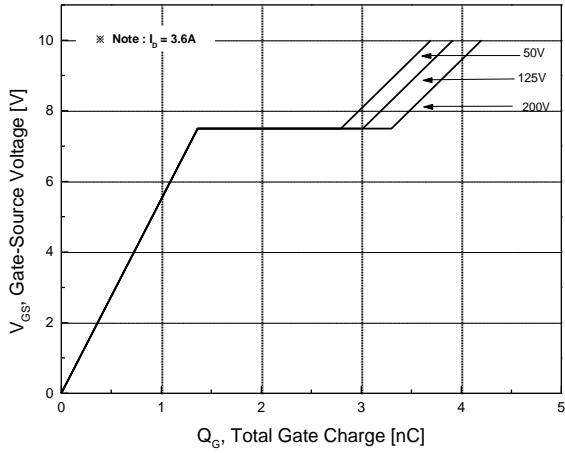
**Fig.4 Breakdown Voltage Variation vs. Temperature**



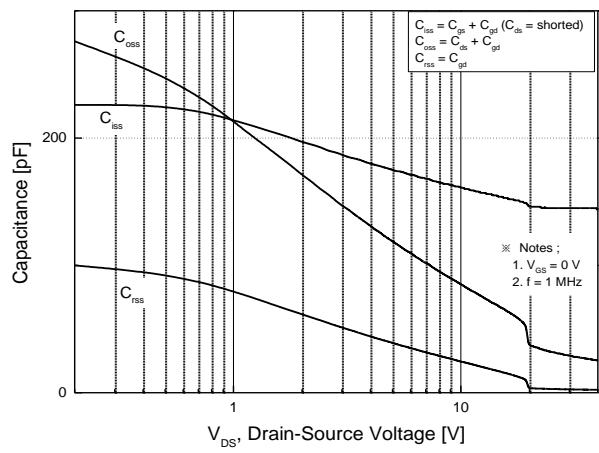
**Fig.5 Transfer Characteristics**



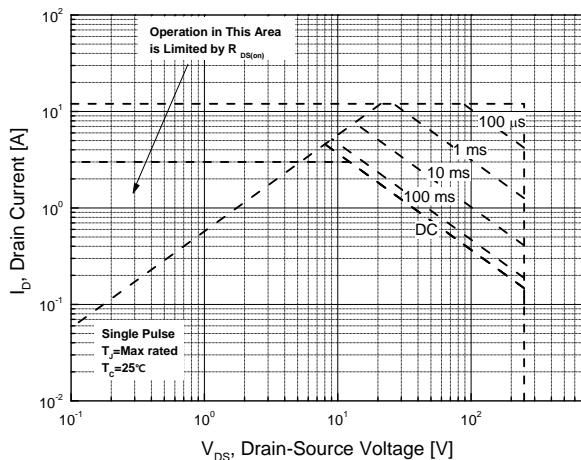
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



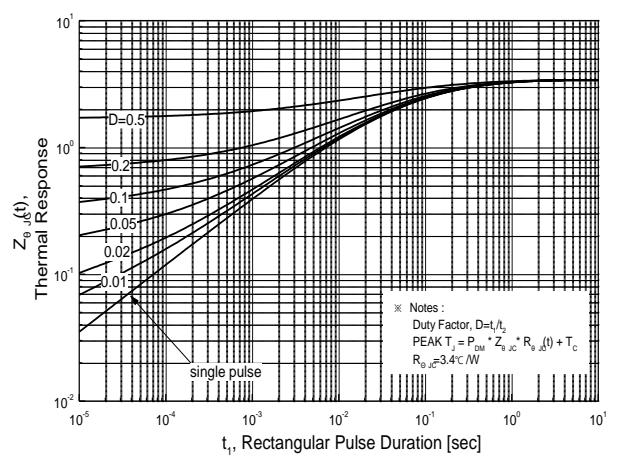
**Fig.7 Gate Charge Characteristics**



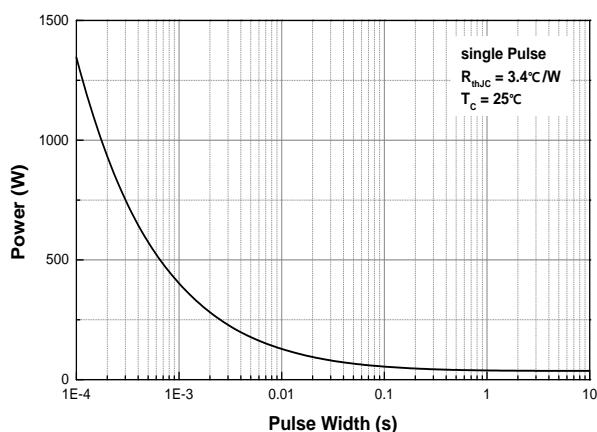
**Fig.8 Capacitance Characteristics**



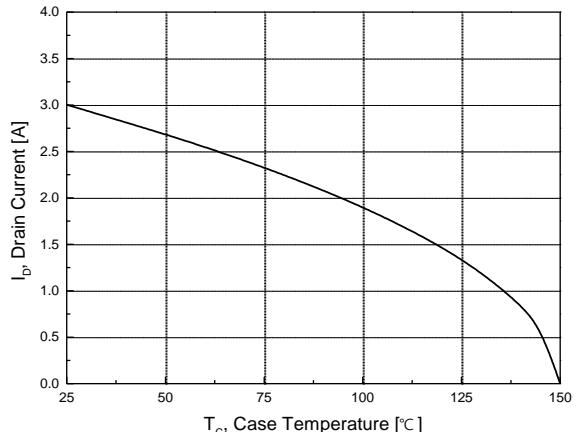
**Fig.9 Maximum Safe Operating Area**



**Fig.10 Transient Thermal Response Curve**



**Fig.11 Single Pulse Maximum Power Dissipation**

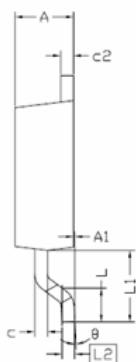
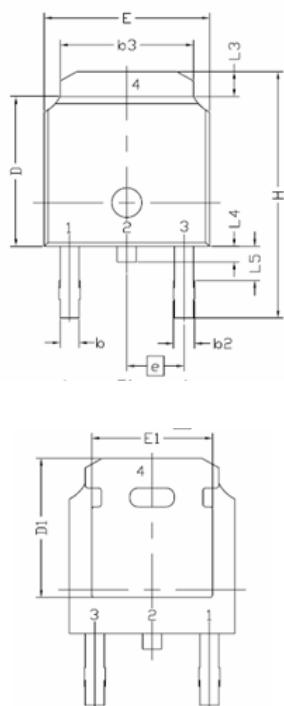


**Fig.12 Maximum Drain Current vs. Case Temperature**

## Physical Dimension

### D-PAK, 3L

Dimensions are in millimeters, unless otherwise specified



Symbol	Min.	Nom.	Max.
E	6,35	-	6,73
L	1,40	1,52	1,78
L1		2,74 REF	
L2		0,508 BCS	
L3	0,89	-	1,27
L4	-	-	1,02
L5	1,14	-	1,52
D	5,97	6,10	6,22
H	9,40	-	10,41
b	0,64	-	0,89
b2	0,76	-	1,14
b3	4,95	-	5,46
e		2,286 BSC	
A	2,18	-	2,39
A1	-	-	0,13
c	0,46	-	0,61
c2	0,46	-	0,89
D1	5,21	-	-
E1	4,32	-	-
θ	0,00	-	10,00

Note : Package body size, length and width do not include mold flash, protrusions and gate burrs.

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