

### General Description

The MDD5N50Z uses advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

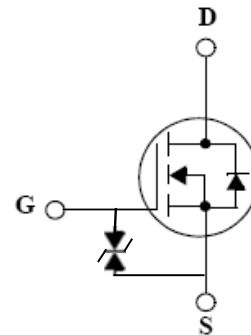
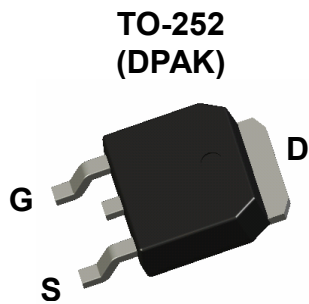
MDD5N50Z is suitable device for SMPS, HID and general purpose applications.

### Features

- $V_{DS} = 500V$
- $V_{DS} = 550V$  @  $T_{jmax}$
- $I_D = 4.4A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} \leq 1.4\Omega$  @  $V_{GS} = 10V$

### Applications

- Power Supply
- PFC
- Ballast



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

Characteristics	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DSS}$	500	V
Drain-Source Voltage @ $T_{jmax}$	$V_{DSS} @ T_{jmax}$	550	V
Gate-Source Voltage	$V_{GSS}$	±30	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	4.4 A
		$T_C=100^\circ C$	2.8 A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	17.6	A
Power Dissipation	$P_D$	$T_C=25^\circ C$	70 W
		Derate above 25 °C	0.56 W/°C
Peak Diode Recovery $dv/dt$ <sup>(3)</sup>	$Dv/dt$	4.5	V/ns
Single Pulse Avalanche Energy <sup>(4)</sup>	$E_{AS}$	230	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>	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case <sup>(1)</sup>	$R_{\theta JC}$	1.8	

## Ordering Information

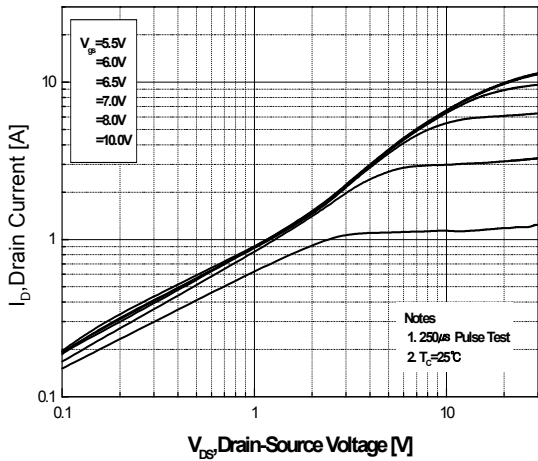
Part Number	Temp. Range	Package	Packing	RoHS Status
MDD5N50ZRH	-55~150°C	DPAK	Reel	Halogen Free

## Electrical Characteristics (Ta =25°C)

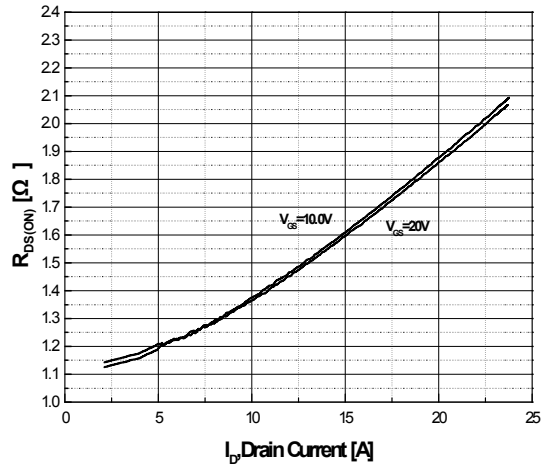
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	500	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	-	5.0	
Drain Cut-Off Current	$I_{DSS}$	$V_{DS} = 500V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	10	$\mu A$
Drain-Source ON Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2.2A$		1.15	1.4	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 30V, I_D = 2.2A$	-	5	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 400V, I_D = 5.0A, V_{GS} = 10V^{(3)}$	-	12.2	16	nC
Gate-Source Charge	$Q_{gs}$		-	3.6	5	
Gate-Drain Charge	$Q_{gd}$		-	4.7	6.5	
Input Capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	500	650	pF
Reverse Transfer Capacitance	$C_{rss}$		-	3	4.0	
Output Capacitance	$C_{oss}$		-	65	85	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 250V, I_D = 5.0A, R_G = 25\Omega^{(3)}$	-	12	35	ns
Rise Time	$t_r$		-	24	60	
Turn-Off Delay Time	$t_{d(off)}$		-	24	60	
Fall Time	$t_f$		-	22	55	
<b>Drain-Source Body Diode Characteristics</b>						
Maximum Continuous Drain to Source Diode Forward Current	$I_S$	$I_S = 4.4A, V_{GS} = 0V$	-	4.4	-	A
Source-Drain Diode Forward Voltage	$V_{SD}$		-		1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 5.0A, di/dt = 100A/\mu s^{(3)}$	-	270		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	1.8		$\mu C$

Note :

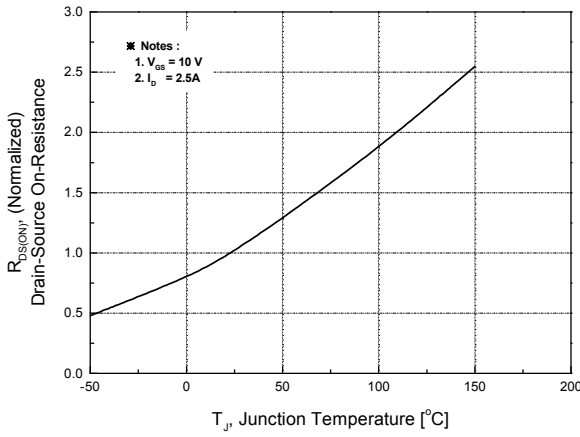
- Pulse width is based on  $R_{\theta JC}$  &  $R_{\theta JA}$  and the maximum allowed junction temperature of 150°C.
- Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ , pulse width limited by junction temperature  $T_J(MAX)=150^\circ C$ .
- $I_{SD} \leq 5.0A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD}=50V$ ,  $R_g = 25\Omega$ , Starting  $T_J=25^\circ C$
- $L=16.5mH$ ,  $I_{AS}=5.0A$ ,  $V_{DD}=50V$ ,  $R_g = 25\Omega$ , Starting  $T_J=25^\circ C$



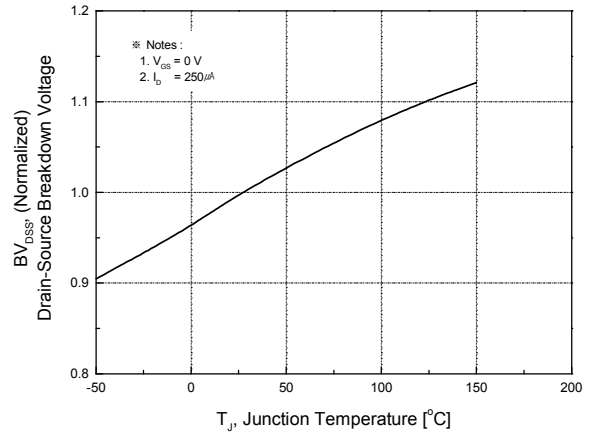
**Fig.1 On-Region Characteristics**



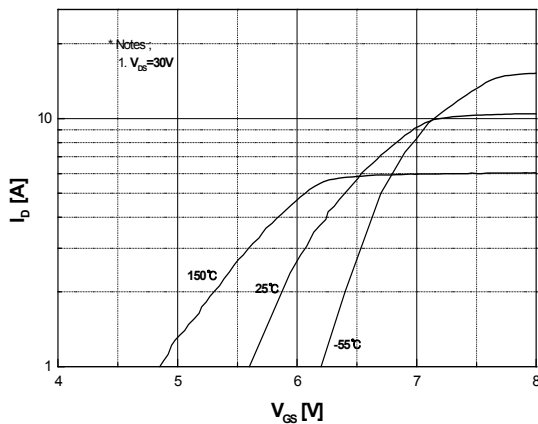
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



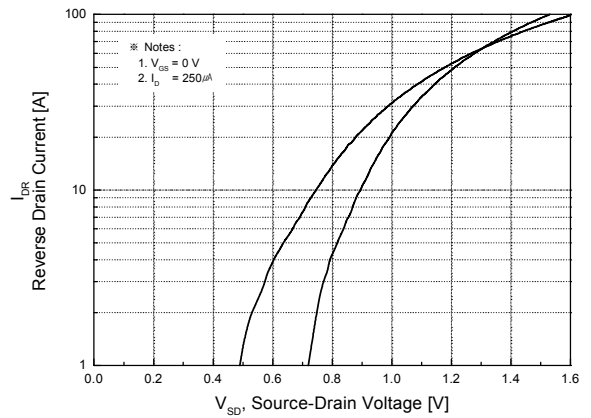
**Fig.3 On-Resistance Variation with Temperature**



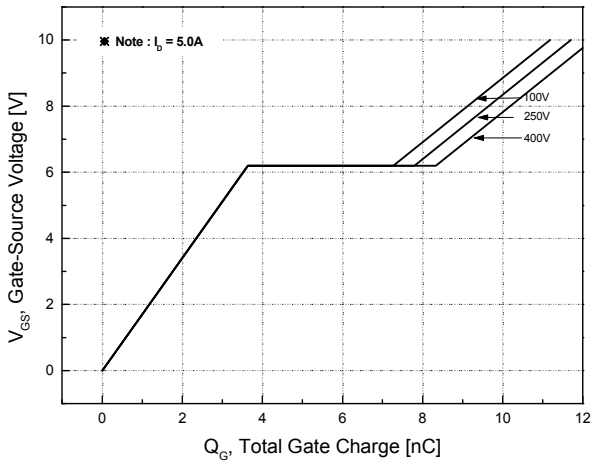
**Fig.4 Breakdown Voltage Variation vs. Temperature**



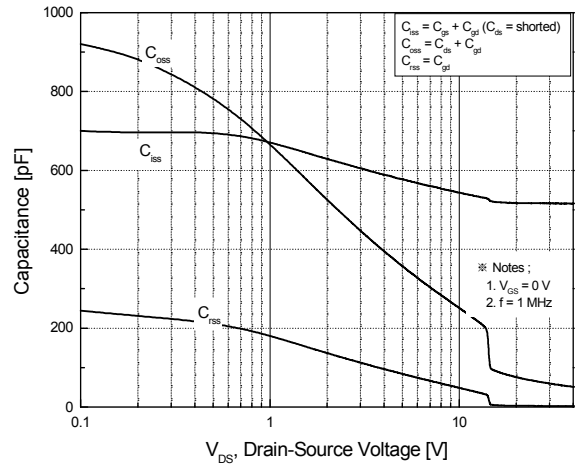
**Fig.5 Transfer Characteristics**



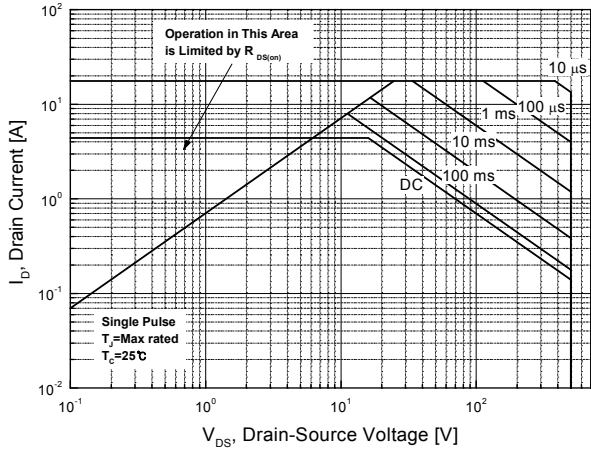
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



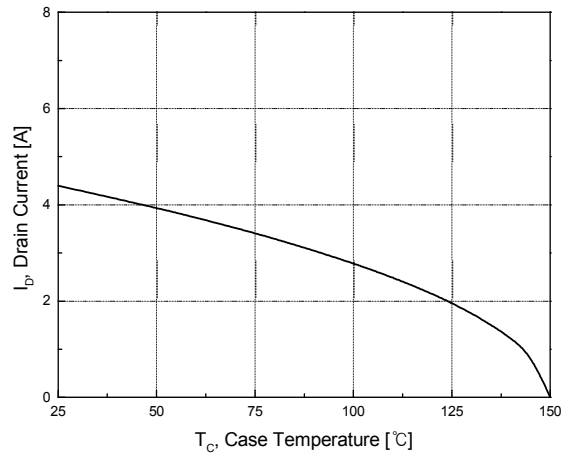
**Fig.7 Gate Charge Characteristics**



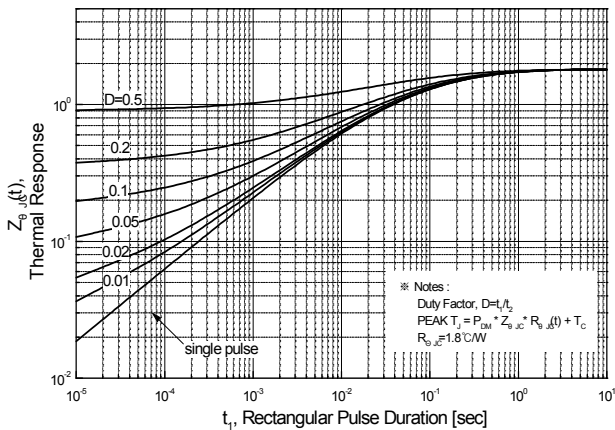
**Fig.8 Capacitance Characteristics**



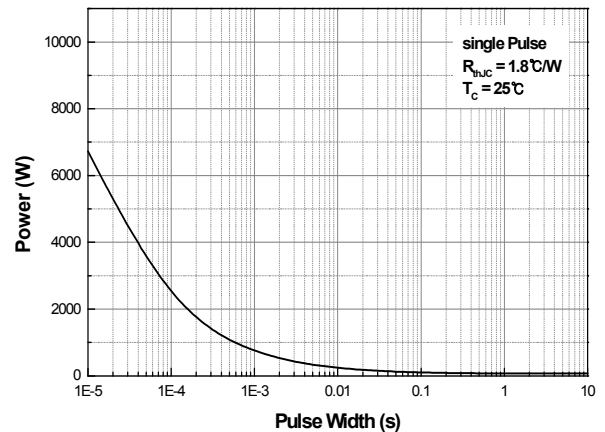
**Fig.9 Maximum Safe Operating Area**



**Fig.10 Maximum Drain Current vs. Case Temperature**



**Fig.11 Transient Thermal Response Curve**

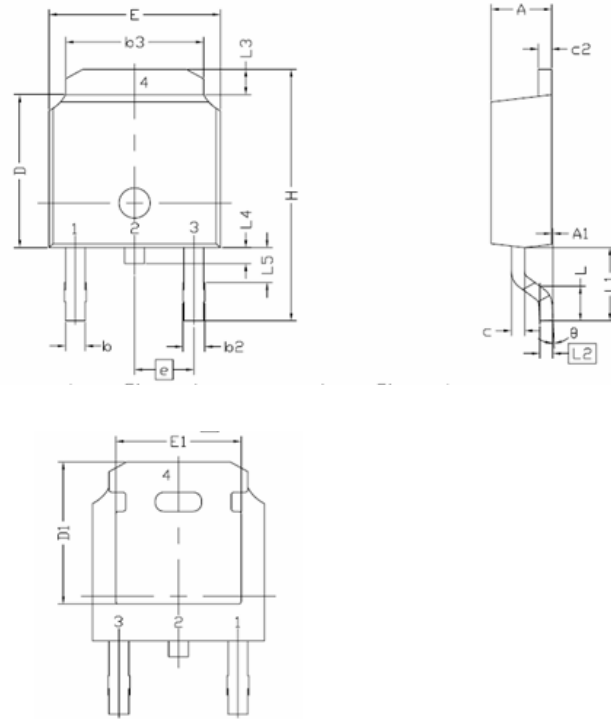


**Fig.12 Single Pulse Maximum Power Dissipation**

**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	-	-
⌀	0.00	-	10.00

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