

### General Description

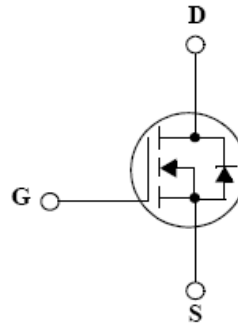
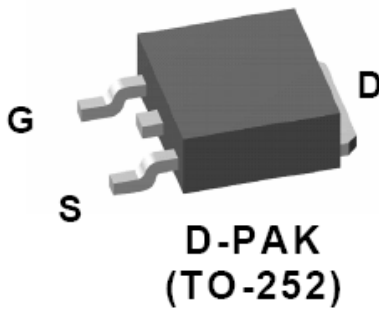
The MDD3N40 use advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality. MDD3N40 are suitable device for SMPS and general purpose applications.

### Features

- $V_{DS} = 400V$
  - $I_D = 2.0A$
  - $R_{DS(ON)} \leq 3.4\Omega$
- @ $V_{GS} = 10V$   
@ $V_{GS} = 10V$

### Applications

- Power Supply
- PFC
- LED TV



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

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		$V_{DSS}$	400	V
Gate-Source Voltage		$V_{GSS}$	±30	V
Continuous Drain Current	$T_C=25^\circ C$	$I_D$	2.0	A
	$T_C=100^\circ C$		1.2	A
Pulsed Drain Current <sup>(1)</sup>		$I_{DM}$	8.0	A
Power Dissipation	$T_C=25^\circ C$	$P_D$	30	W
	Derate above 25 °C		0.24	W/°C
Peak Diode Recovery $dv/dt$ <sup>(3)</sup>		$dv/dt$	4.5	V/ns
Repetitive Pulse Avalanche Energy <sup>(4)</sup>		$E_{AR}$	3.0	mJ
Avalanche current <sup>(1)</sup>		$I_{AR}$	2.0	A
Single Pulse Avalanche Energy <sup>(4)</sup>		$E_{AS}$	45	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>	$R_{\theta JA}$	110	°C/W
Thermal Resistance, Junction-to-Case <sup>(1)</sup>	$R_{\theta JC}$	4.1	

## Ordering Information

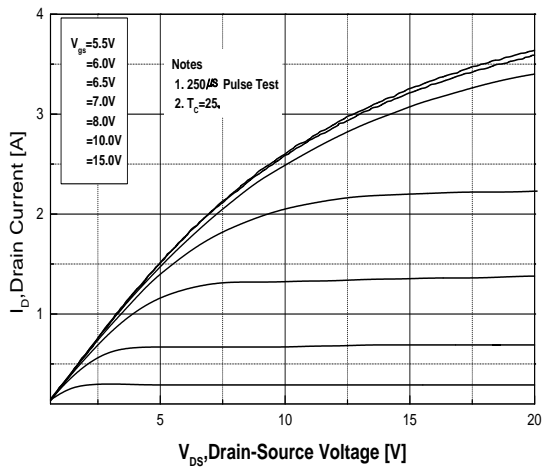
Part Number	Temp. Range	Package	Packing	RoHS Status
MDD3N40RH	-55~150°C	D-pak	Reel	Halogen Free

## Electrical Characteristics (Ta =25°C)

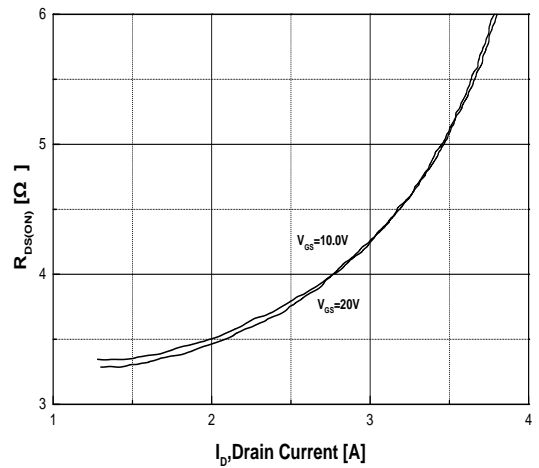
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	400	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	-	5.0	
Drain Cut-Off Current	$I_{DSS}$	$V_{DS} = 500V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 1.0A$	-	2.8	3.4	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 30V, I_D = 1.0A$	-	2.0	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 320V, I_D = 3.0A, V_{GS} = 10V^{(3)}$	-	5.1	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.4	-	
Gate-Drain Charge	$Q_{gd}$		-	3.9	-	
Input Capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	167	-	$\mu F$
Reverse Transfer Capacitance	$C_{rss}$		-	2	-	
Output Capacitance	$C_{oss}$		-	27	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 200V, I_D = 3.0A, R_G = 25\Omega^{(3)}$	-	10	-	ns
Rise Time	$t_r$		-	30	-	
Turn-Off Delay Time	$t_{d(off)}$		-	12	-	
Fall Time	$t_f$		-	25	-	
<b>Drain-Source Body Diode Characteristics</b>						
Maximum Continuous Drain to Source Diode Forward Current	$I_S$		-	0.5	-	A
Source-Drain Diode Forward Voltage	$V_{SD}$	$I_S = 3.0A, V_{GS} = 0V$	-	-	1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 3.0A, di/dt = 100A/\mu s^{(3)}$	-	185	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	0.6	-	$\mu C$

Note :

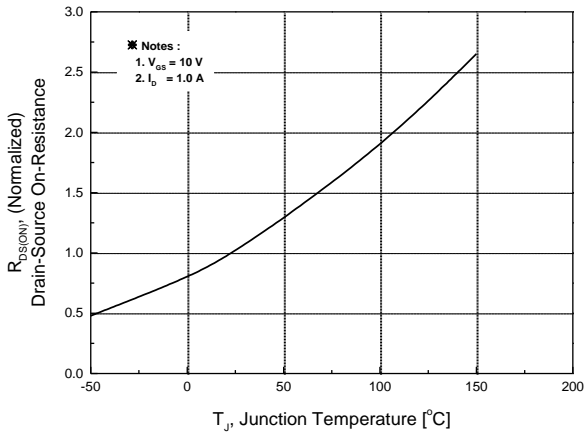
- Pulse width is based on  $R_{\theta JC}$  &  $R_{\theta JA}$  and the maximum allowed junction temperature of 150°C.
- Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ , pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ C$ .
- $I_{SD} \leq 3.0A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD}=50V$ ,  $R_g = 25\Omega$ , Starting  $T_J=25^\circ C$
- $L=9.2mH$ ,  $I_{AS}=3.0A$ ,  $V_{DD}=50V$ ,  $R_g = 25\Omega$ , Starting  $T_J=25^\circ C$



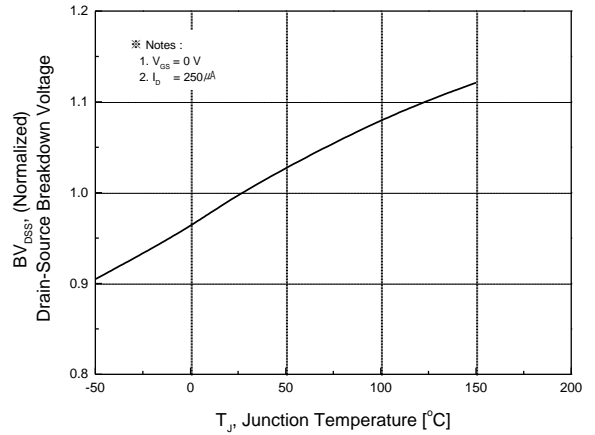
**Fig.1 On-Region Characteristics**



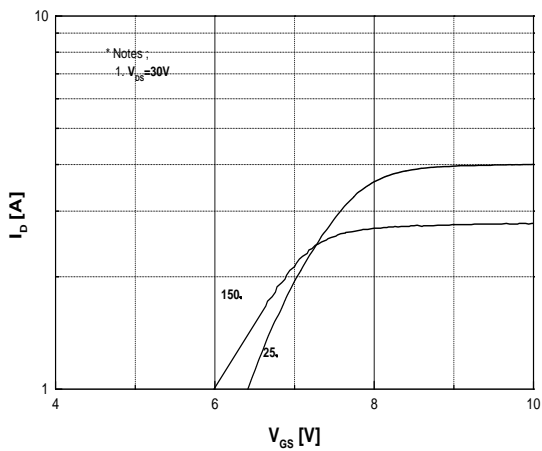
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



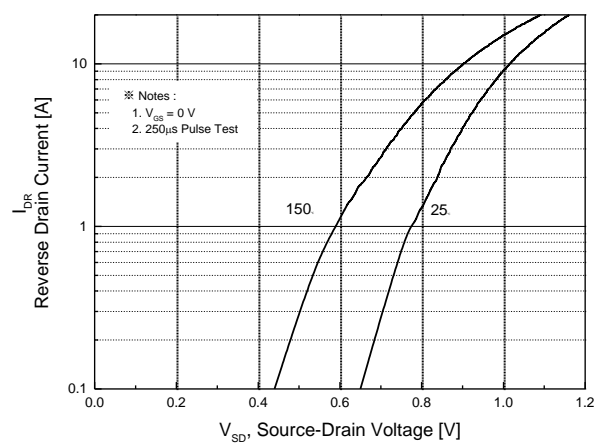
**Fig.3 On-Resistance Variation with Temperature**



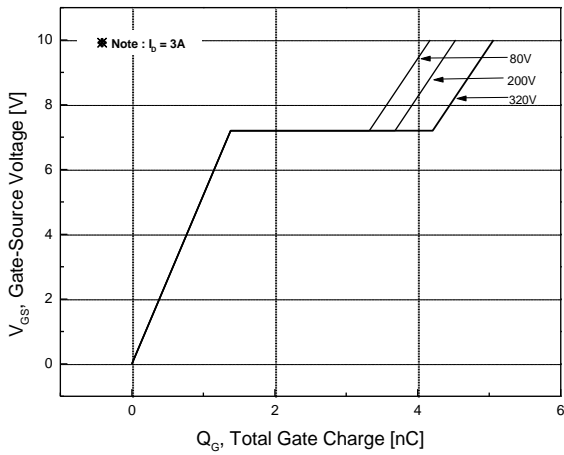
**Fig.4 Breakdown Voltage Variation vs. Temperature**



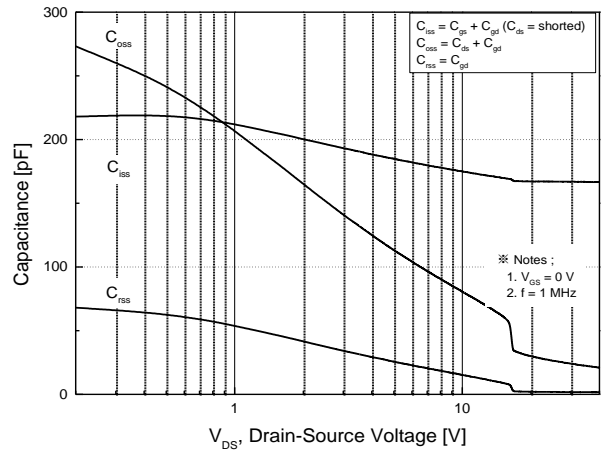
**Fig.5 Transfer Characteristics**



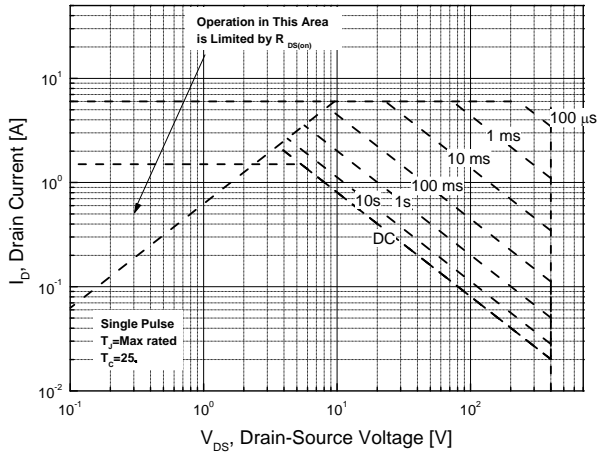
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



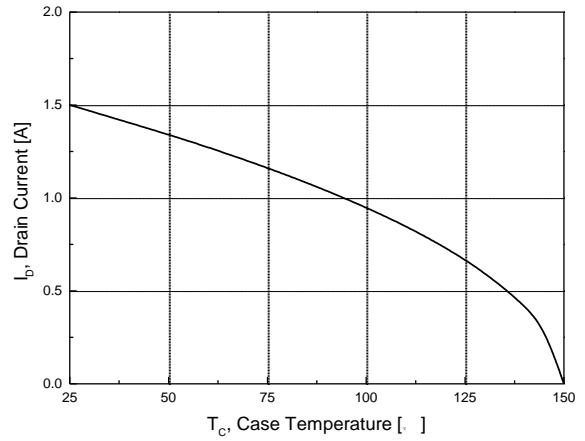
**Fig.7 Gate Charge Characteristics**



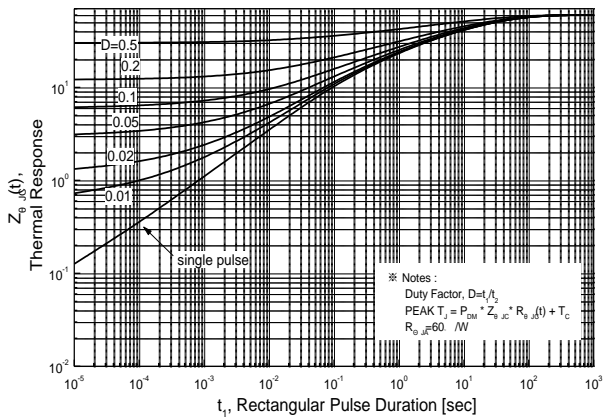
**Fig.8 Capacitance Characteristics**



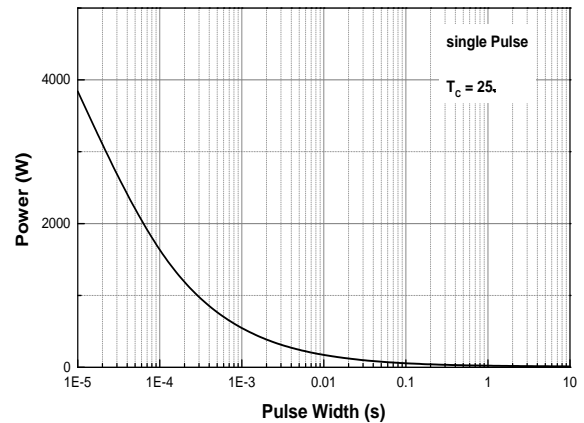
**Fig.9 Maximum Safe Operating Area**



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



**Fig.11 Transient Thermal Response Curve**

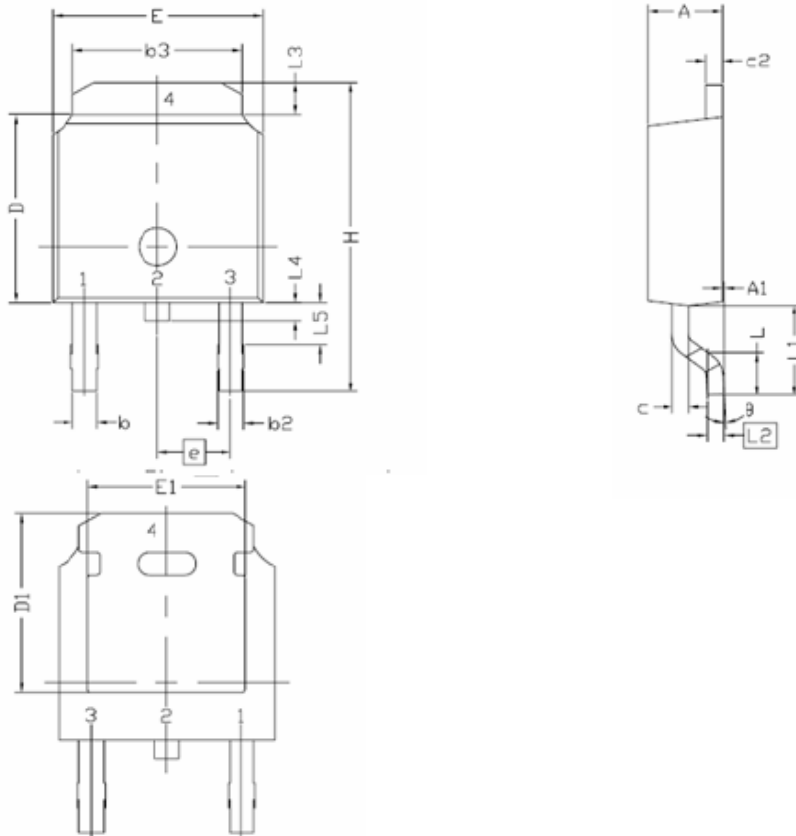


**Fig.12 Single Pulse Maximum Power Dissipation**

**Physical Dimension**

**D-PAK (TO-252)**


Dimensions are in millimeters, unless otherwise specified



Symbol	Min	Nom	Max
E	6.35	-	6.73
L	1.40	1.52	1.78
L1	2.74REF		
L2	0.508BCS		
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	2.286BSC		
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

**DISCLAIMER:**

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