

# MDD1752

## N-Channel Trench MOSFET 40V, 50A, 8.0mΩ

**MDD1752- N-Channel Trench MOSFET 40V, 50A, 8.0mΩ**

### General Description

The MDD1752 uses advanced Magnachip's trench MOSFET Technology to provide high performance in on-state resistance, switching performance and reliability

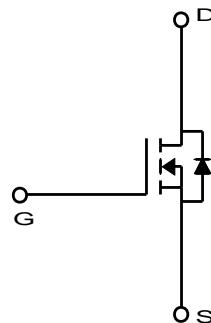
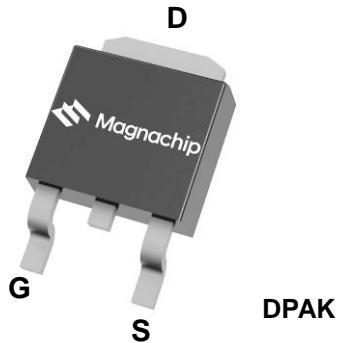
Low  $R_{DS(ON)}$ , low gate charge can be offering superior benefit in the application.

### Features

- $V_{DS} = 40V$
- $I_D = 50A @ V_{GS} = 10V$
- $R_{DS(ON)}$   
 $< 8.0m\Omega @ V_{GS} = 10V$   
 $< 10.5m\Omega @ V_{GS} = 4.5V$

### Applications

- Inverters
- General purpose applications



### Absolute Maximum Ratings ( $T_c = 25^\circ C$ unless otherwise noted)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		$V_{DSS}$	40	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 2)	$T_c = 25^\circ C$ (a)	$I_D$	50	A
	$T_A = 25^\circ C$ (b)		15.2	A
Pulsed Drain Current		$I_{DM}$	100	A
Power Dissipation for Single Operation	$T_c = 25^\circ C$	$P_D$	45	W
	$T_A = 25^\circ C$		3.1	
Single Pulse Avalanche Energy		$E_{AS}$	153	mJ
Junction and Storage Temperature Range		$T_J, T_{stg}$	-55~+150	°C

### Thermal Characteristics

Characteristics		Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient	(Note 1)	$R_{\theta JA}$	40	°C/W
		$R_{\theta JC}$	2.8	

## Ordering Information

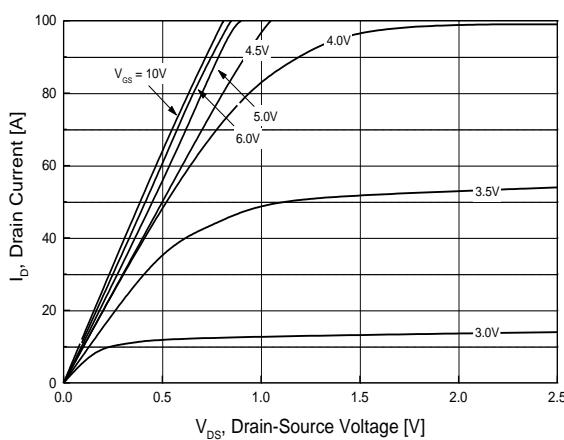
Part Number	Temp. Range	Package	Packing	RoHS Status
MDD1752RH	-55~150°C	TO-252	Tape & Reel	Halogen Free

## Electrical Characteristics ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

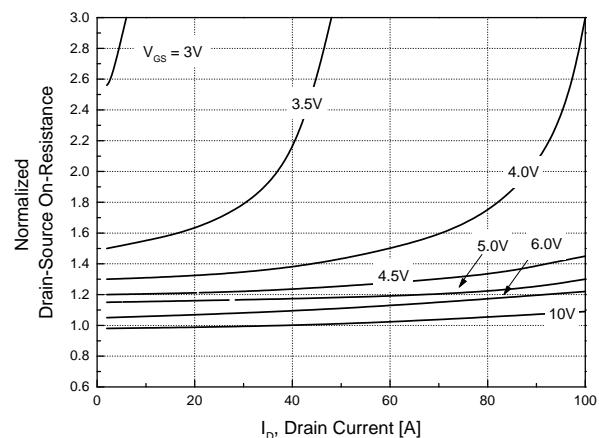
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	40	-	-	V
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.0	1.7	3.0	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	0.1	
Drain-Source ON Resistance	$R_{DS(\text{ON})}$	$V_{GS} = 10\text{V}, I_D = 14\text{A}$	-	6.1	8.0	$\text{m}\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 11\text{A}$	-	8.2	10.5	
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{V}, I_D = 14\text{A}$	-	58	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 20\text{V}, I_D = 14\text{A}, V_{GS} = 10\text{V}$	-	26.4	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.6	-	
Gate-Drain Charge	$Q_{gd}$		-	6.8	-	
Input Capacitance	$C_{iss}$	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$	-	1480	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	113	-	
Output Capacitance	$C_{oss}$		-	243	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 20\text{V}, I_D = 1\text{A}, R_{GEN} = 6\Omega$	-	9	-	ns
Turn-On Rise Time	$t_r$		-	21	-	
Turn-Off Delay Time	$t_{d(off)}$		-	31	-	
Turn-Off Fall Time	$t_f$		-	18	-	
<b>Drain-Source Body Diode Characteristics</b>						
Source-Drain Diode Forward Voltage	$V_{SD}$	$I_S = 14\text{A}, V_{GS} = 0\text{V}$	-	0.8	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 14\text{A}, dI/dt = 100\text{A}/\mu\text{s}$	-	26	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	11	-	nC

Note :

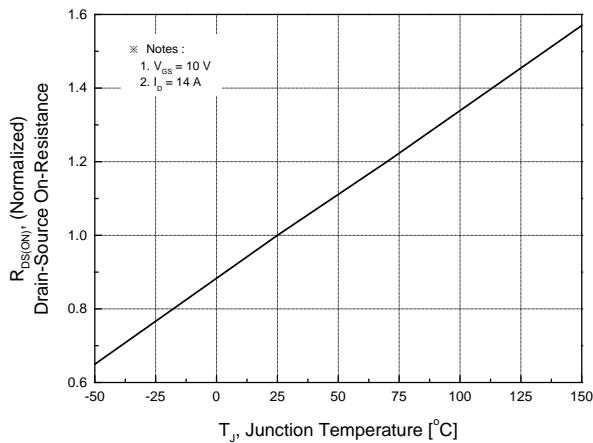
1. Surface mounted RF4 board with 2oz. Copper.
2.  $P_D$  is based on  $T_{J(\text{MAX})}=150^\circ\text{C}$ 
  - a.  $P_D$  ( $T_c=25^\circ\text{C}$ ) is based on  $R_{\theta JC}$ ,
  - b.  $P_D$  ( $T_A=25^\circ\text{C}$ ) is based on  $R_{\theta JA}$
3. Starting  $T_J=25^\circ\text{C}$ ,  $L=1\text{mH}$ ,  $I_{AS}=17.5\text{A}$ ,  $V_{DD}=40\text{V}$ ,  $V_{GS}=10\text{V}$



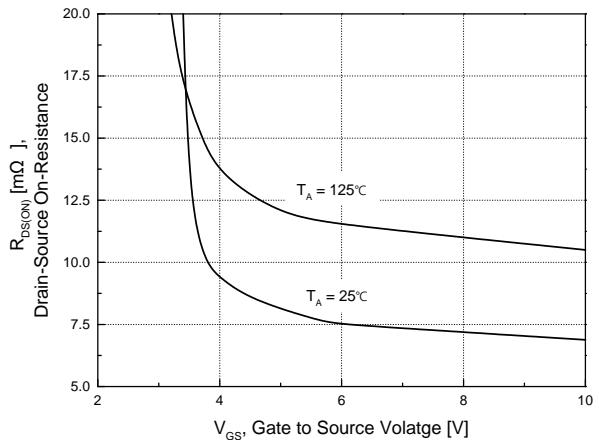
**Fig.1 On-Region Characteristics**



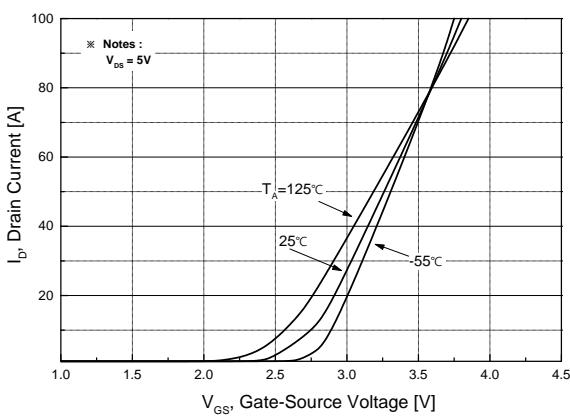
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



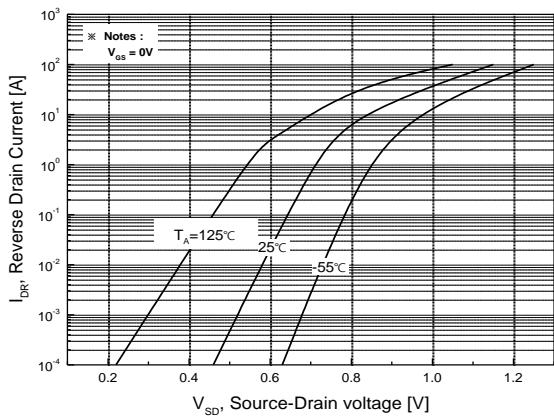
**Fig.3 On-Resistance Variation with Temperature**



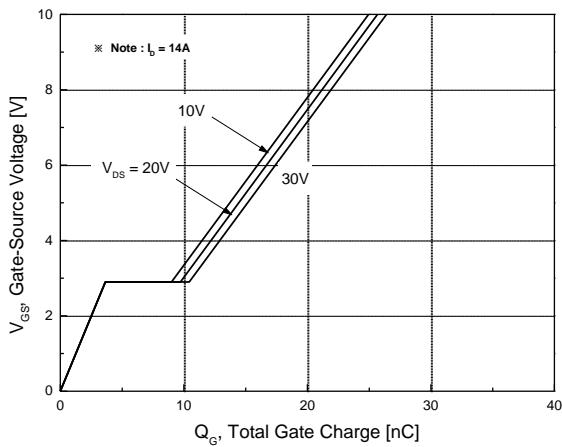
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



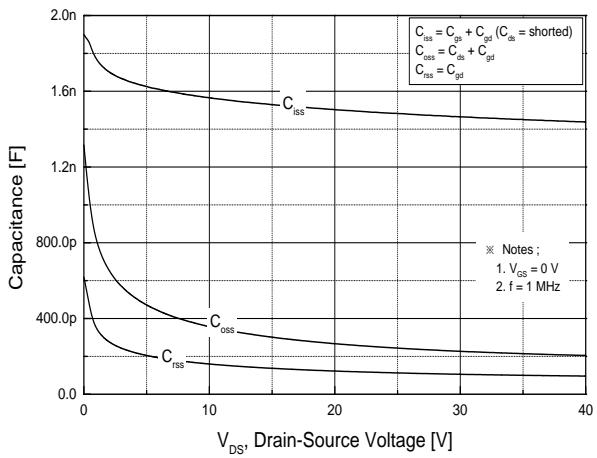
**Fig.5 Transfer Characteristics**



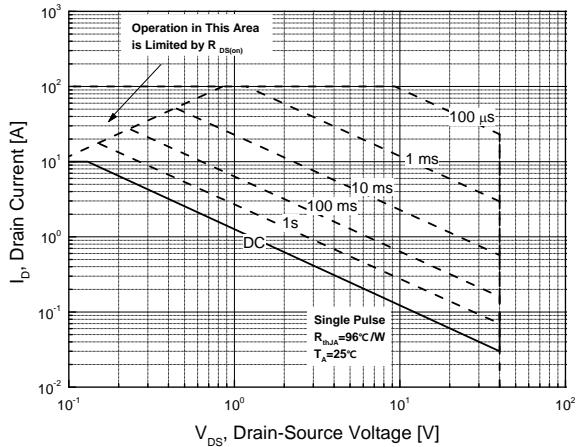
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



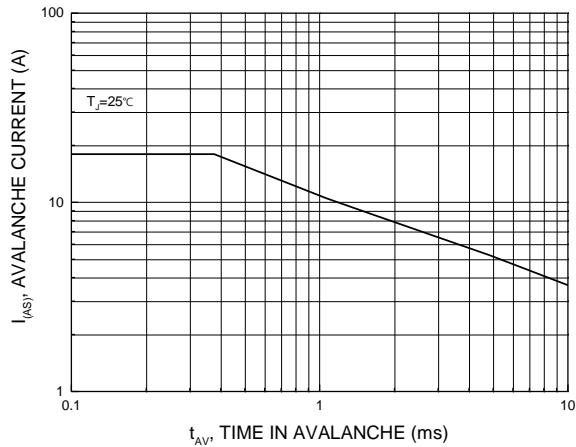
**Fig.7 Gate Charge Characteristics**



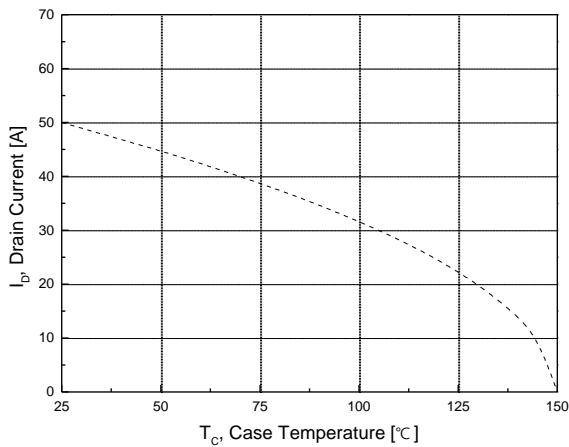
**Fig.8 Capacitance Characteristics**



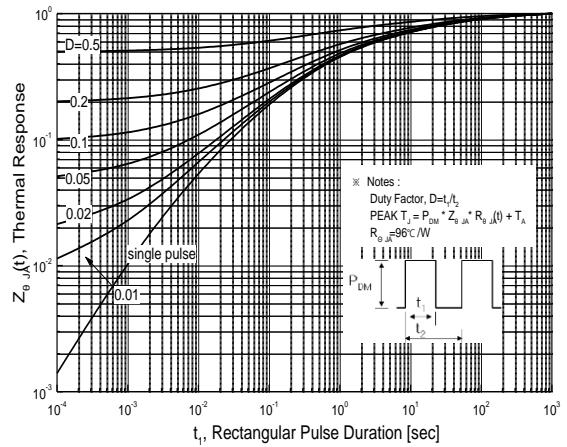
**Fig.9 Maximum Safe Operating Area**



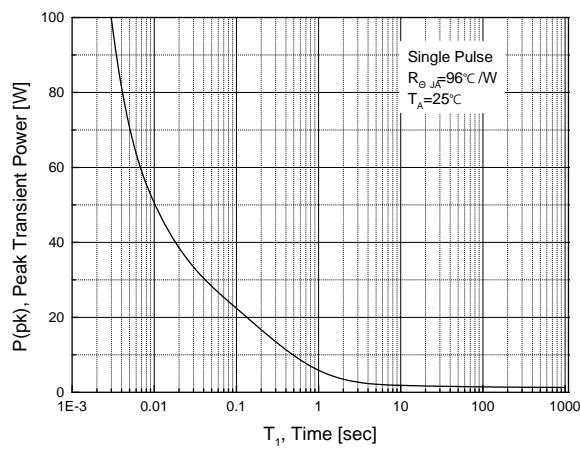
**Fig.10 Unclamped Inductive Switching Capability**



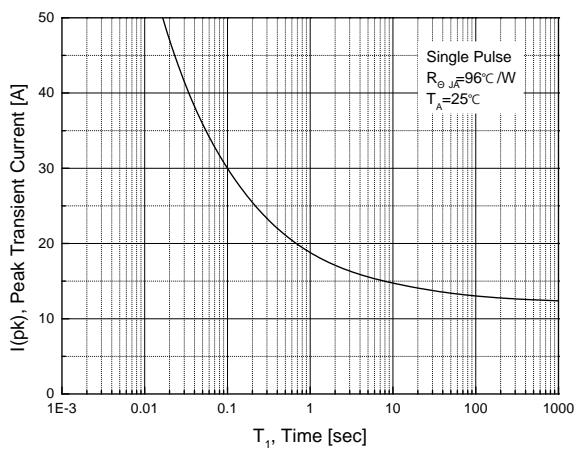
**Fig.11 Maximum Drain Current vs. Case Temperature**



**Fig.12 Transient Thermal Response Curve**



**Fig13. Single Pulse Maximum Power Dissipation**

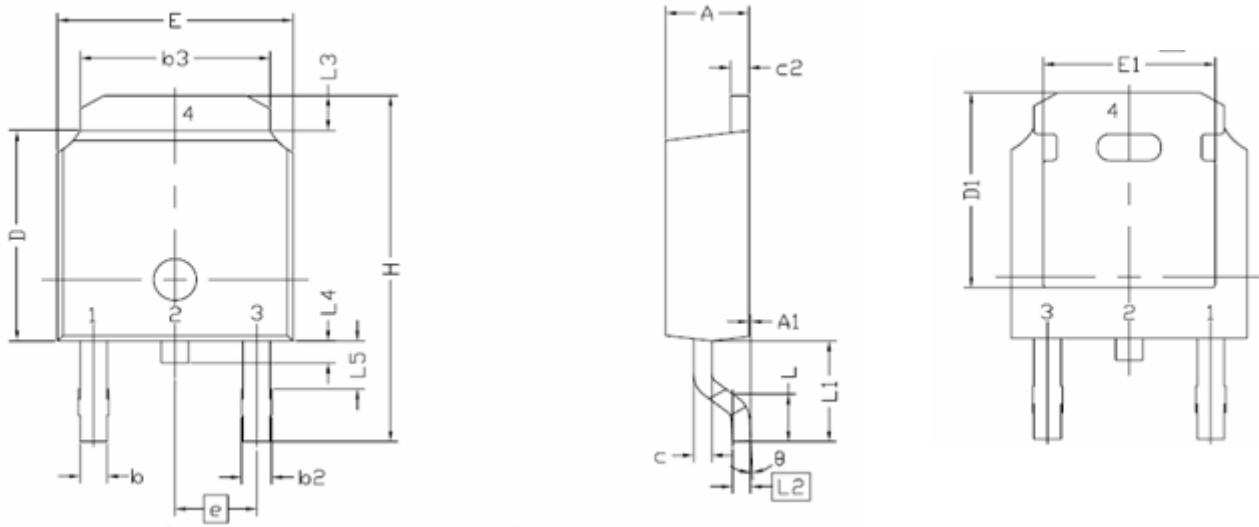


**Fig14. Single Pulse Maximum Peak Current**

## Physical Dimensions

### TO-252 (DPAK)

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.

**DISCLAIMER:**

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