

### General Description

The MDF1752 uses advanced Magnachip's trench MOSFET Technology to provide high performance in on-state resistance, switching performance and reliability

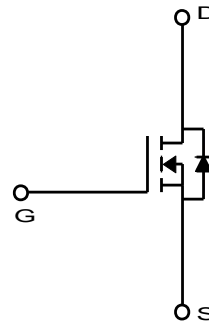
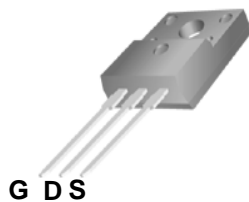
Low  $R_{DS(ON)}$ , low gate charge can be offering superior benefit in the application.

### 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 1)	$T_C = 25^\circ C$ (a)	$I_D$	50	A
	$T_C = 100^\circ C$		31.8	
	$T_A = 25^\circ C$ (b)		12.6	
	$T_A = 100^\circ C$		8.0	
Pulsed Drain Current		$I_{DM}$	100	A
Power Dissipation for Single Operation	$T_C = 25^\circ C$	$P_D$	32	W
	$T_C = 100^\circ C$		12.8	
	$T_A = 25^\circ C$		2	
	$T_A = 100^\circ C$		0.8	
Single Pulse Avalanche Energy (Note 2)		$E_{AS}$	153	mJ
Junction and Storage Temperature Range		$T_J, T_{stg}$	-55~+150	$^\circ C$

### Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ C/W$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.9	

## Ordering Information

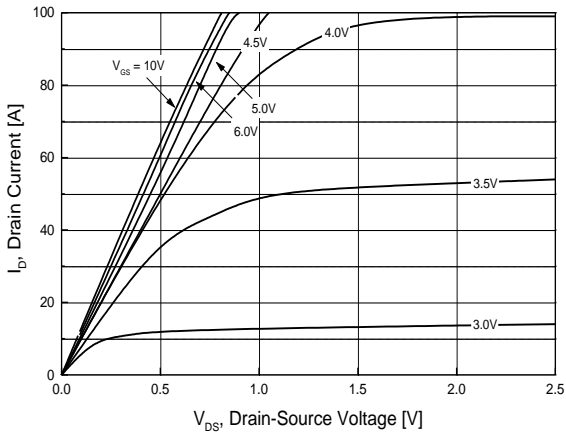
Part Number	Temp. Range	Package	Packing	RoHS Status
MDF1752TH	-55~150°C	TO-220F	Tube	Halogen Free

## Electrical Characteristics (T<sub>J</sub> =25°C unless otherwise noted)

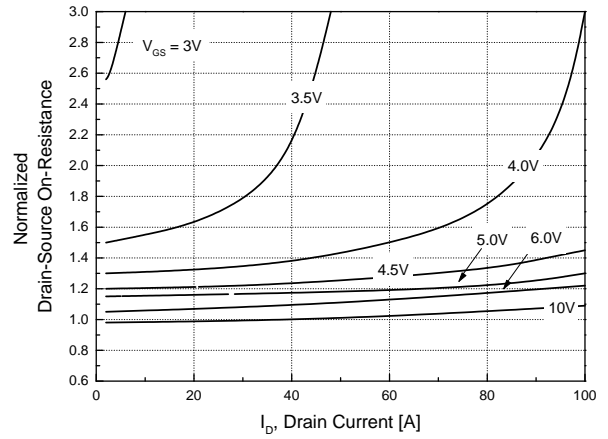
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	40	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1.0	1.7	3.0	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	0.1	
Drain-Source ON Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 14A	-	6.1	8.0	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11A	-	8.2	10.5	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 5V, I <sub>D</sub> = 14A	-	58	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 20V, I <sub>D</sub> = 14A, V <sub>GS</sub> = 10V	-	26.4	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	3.6	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	6.8	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1.0MHz	-	1480	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	113	-	
Output Capacitance	C <sub>oss</sub>		-	243	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 20V, I <sub>D</sub> = 1A, R <sub>GEN</sub> = 6Ω	-	9	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	21	-	
Trun-Off Delay Time	t <sub>d(off)</sub>		-	31	-	
Trun-Off Fall Time	t <sub>f</sub>		-	18	-	
<b>Drain-Source Body Diode Characteristics</b>						
Source-Drain Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 14A, V <sub>GS</sub> = 0V	-	0.8	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 14A, di/dt = 100A/μs	-	26	-	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>		-	11	-	nC

Note :

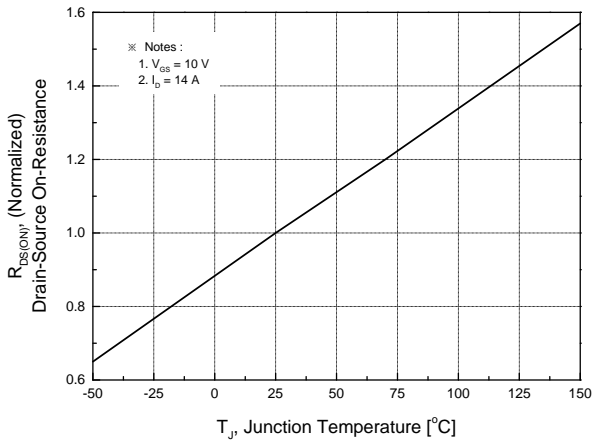
- P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C
  - P<sub>D</sub> (T<sub>C</sub>=25°C) is based on R<sub>θJC</sub>,
  - P<sub>D</sub> (T<sub>A</sub>=25°C) is based on R<sub>θJA</sub>
- Starting T<sub>J</sub>=25°C, L=1mH, I<sub>AS</sub>=17.5A, V<sub>DD</sub>=40V, V<sub>GS</sub>=10V



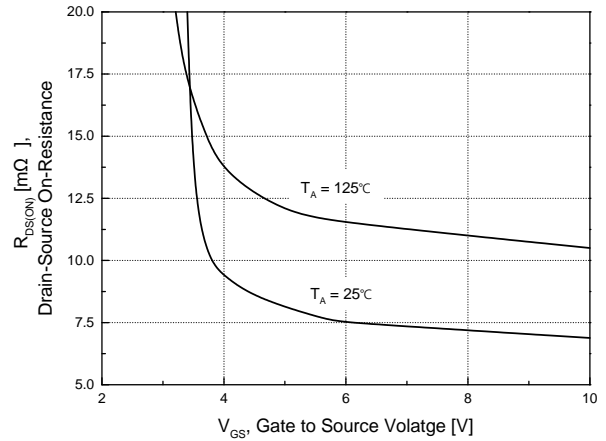
**Fig.1 On-Region Characteristics**



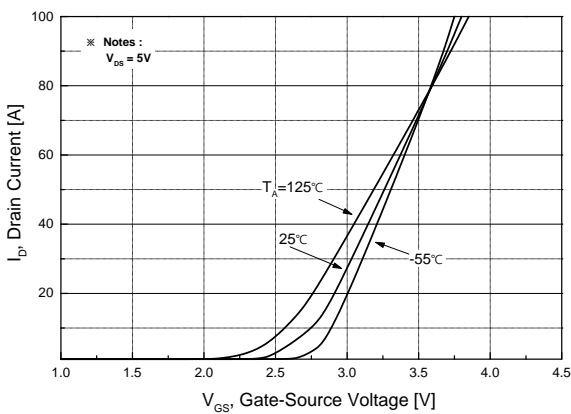
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



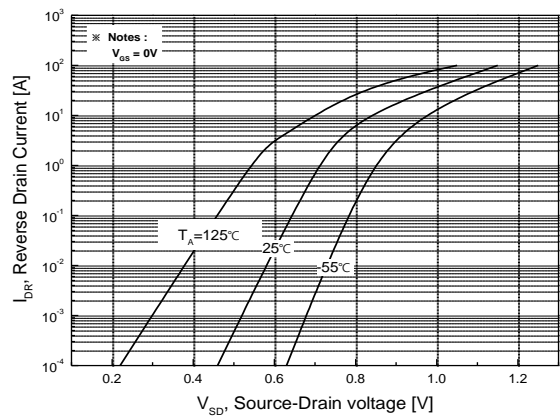
**Fig.3 On-Resistance Variation with Temperature**



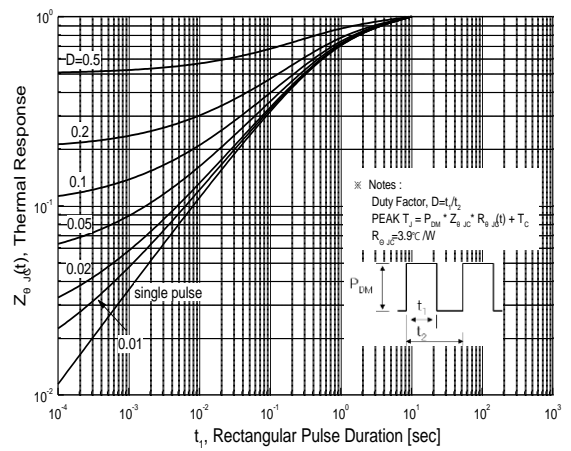
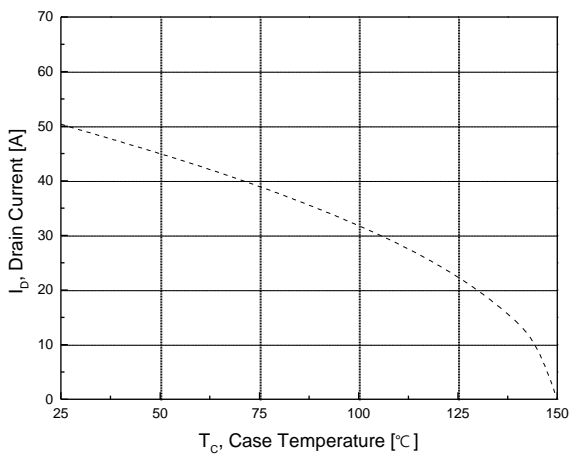
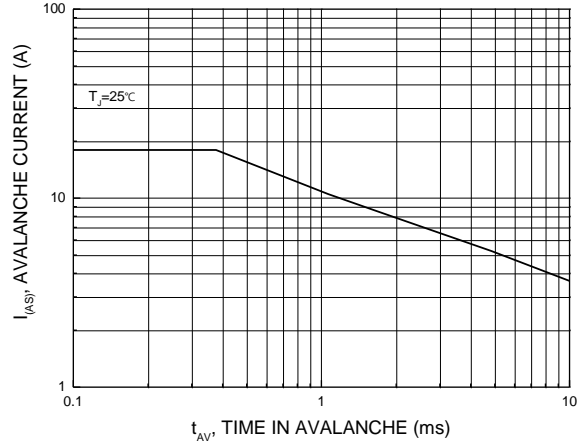
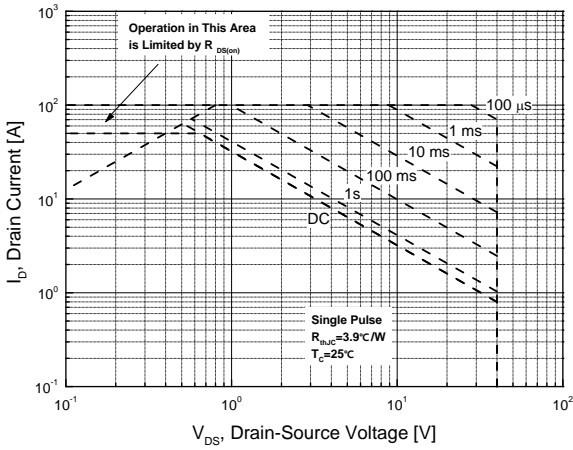
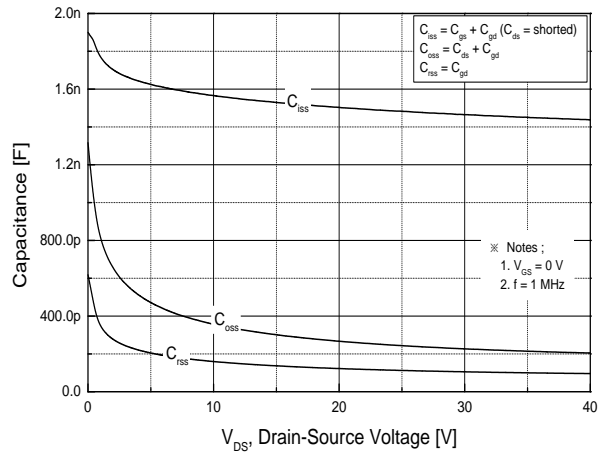
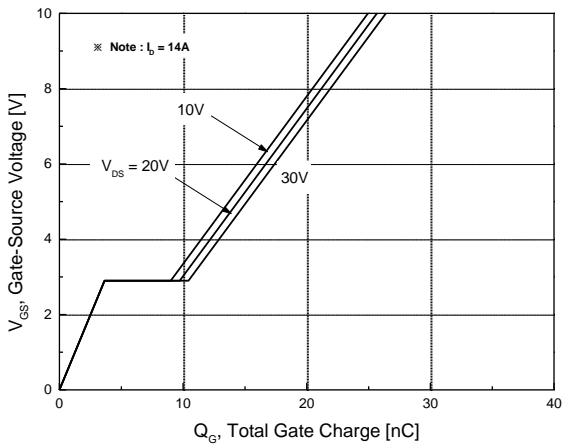
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



**Fig.5 Transfer Characteristics**



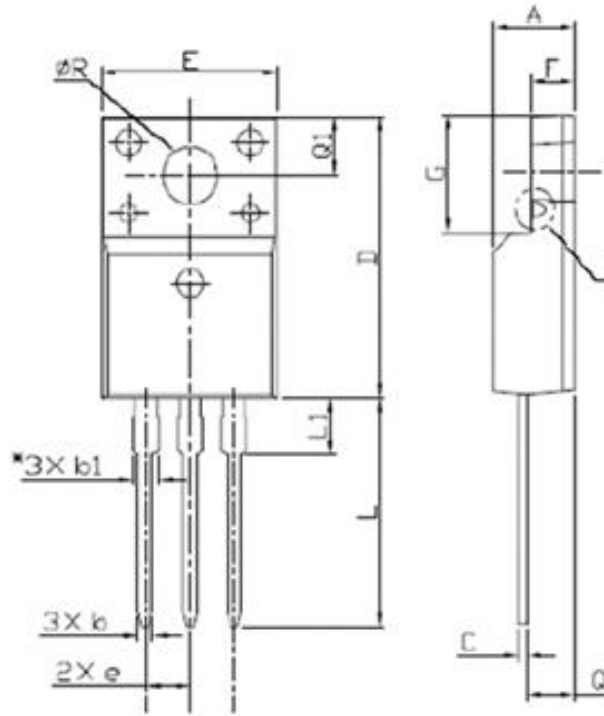
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



## Physical Dimensions

Dimensions are in millimeters unless otherwise specified

**TO-220F Package Outline Drawing**



※Note1 : PKG Body Sizes exclude Mold Flash & Gate Burrs

Symbol	Min	Nom	Max
A	4.50	-	4.93
b	0.63	-	0.91
b1	1.15	-	1.47
C	0.33	-	0.63
D	15.47	-	16.13
E	9.60	-	10.71
e	2.54 BSC		
F	2.34	-	2.84
G	6.48	-	6.90
L	12.24	-	13.72
L1	2.79	-	3.67
Q	2.52	-	2.96
Q1	3.10	-	3.50
$\phi R$	3.00	-	3.55

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

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