

### General Description

The MDF3752 uses advanced MagnaChip's Trench MOSFET Technology to provided high performance in on-state resistance, switching performance and reliability.

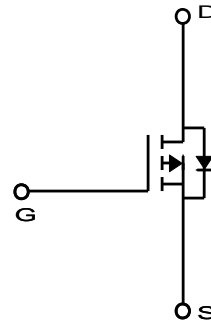
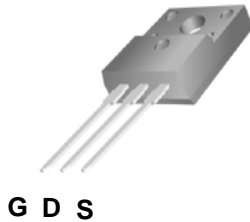
Low  $R_{DS(ON)}$ , Low Gate Charge can be offering superior benefit in the application.

### Features

- $V_{DS} = -40V$
- $I_D = -36.5A @ V_{GS} = -10V$
- $R_{DS(ON)} < 17m\Omega @ V_{GS} = -10V$   
 $< 25m\Omega @ V_{GS} = -4.5V$

### Applications

- Inverters
- General purpose applications



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

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		$V_{DSS}$	-40	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	$T_C = 25^\circ C$	$I_D$	-36.5	A
	$T_C = 100^\circ C$		-23.1	A
Pulsed Drain Current		$I_{DM}$	-90	A
Power Dissipation	$T_C = 25^\circ C$	$P_D$	35.7	W
	$T_C = 100^\circ C$		14.3	
Single Pulse Avalanche Energy		$E_{AS}$	128	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	$R_{\theta JC}$	3.5	

## Ordering Information

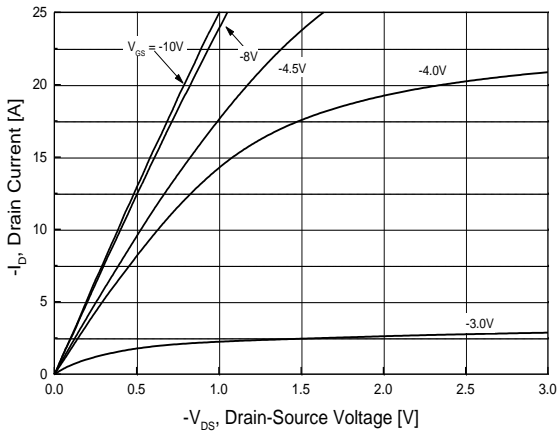
Part Number	Temp. Range	Package	Packing	RoHS Status
MDF3752TH	-55~150°C	TO-220F	Tube	Halogen Free

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

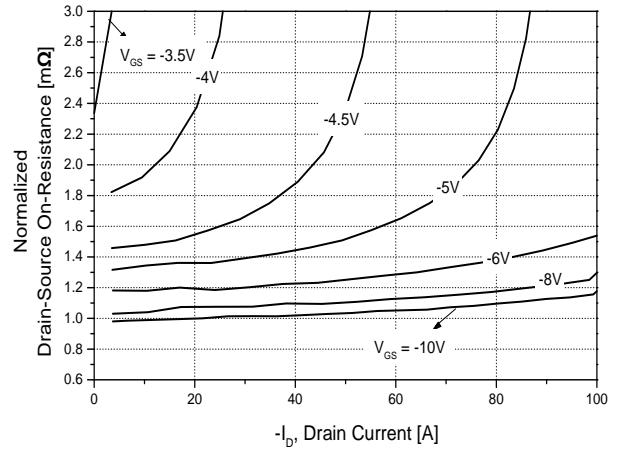
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V	-40	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.0	-2.0	-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> = -20A	-	13	17	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A	-	19	25	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -20A	-	40	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DD</sub> = -20V, I <sub>D</sub> = -20A, V <sub>GS</sub> = -10V	-	44.1	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	8.6	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	9.3	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V, f = 1.0MHz	-	2088	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	168	-	
Output Capacitance	C <sub>oss</sub>		-	290	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = -10V, V <sub>DD</sub> = -20V, I <sub>D</sub> = -1A, R <sub>GEN</sub> = 6.0Ω	-	17.6	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	17.8	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	59.0	-	
Turn-Off Fall Time	t <sub>f</sub>		-	19.8	-	
<b>Drain-Source Body Diode Characteristics</b>						
Source-Drain Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = -20A, V <sub>GS</sub> = 0V	-	-	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>S</sub> = -20A, di/dt = 100A/us	-	40	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	40	-	nC

Note :

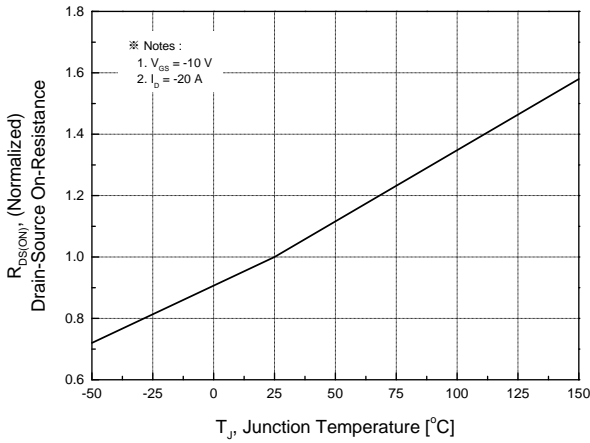
- P<sub>D</sub> is based on T<sub>J(MAX)</sub> = 150°C, P<sub>D</sub>(T<sub>C</sub> = 25°C) is based on R<sub>θJC</sub>.
- Starting T<sub>J</sub> = 25°C, L = 1mH, I<sub>AS</sub> = -16A, V<sub>DD</sub> = -20V, V<sub>GS</sub> = -10V



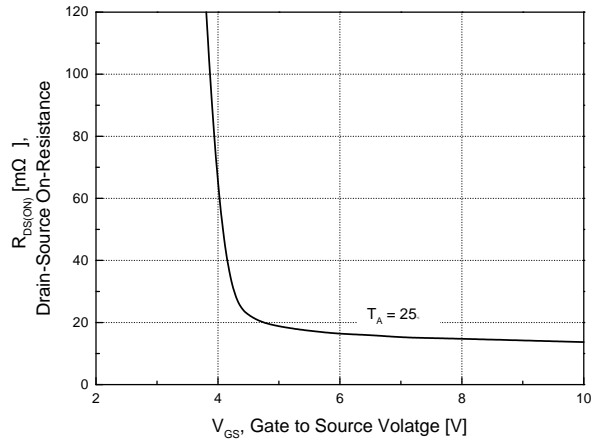
**Fig.1 On-Region Characteristics**



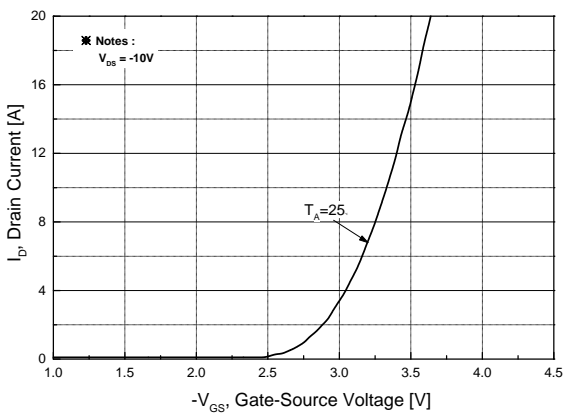
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



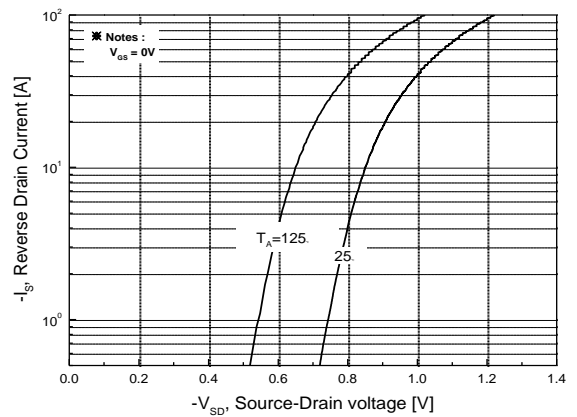
**Fig.3 On-Resistance Variation with Temperature**



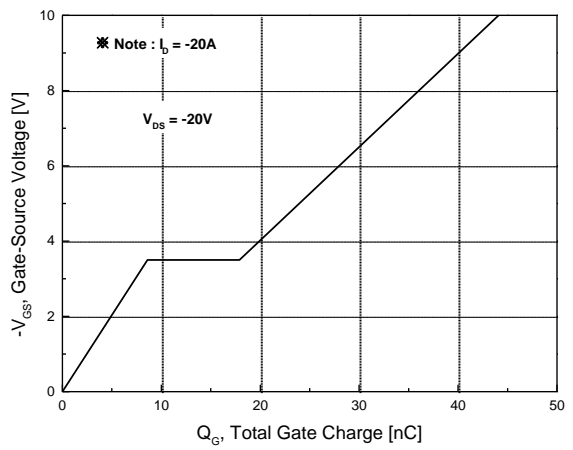
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



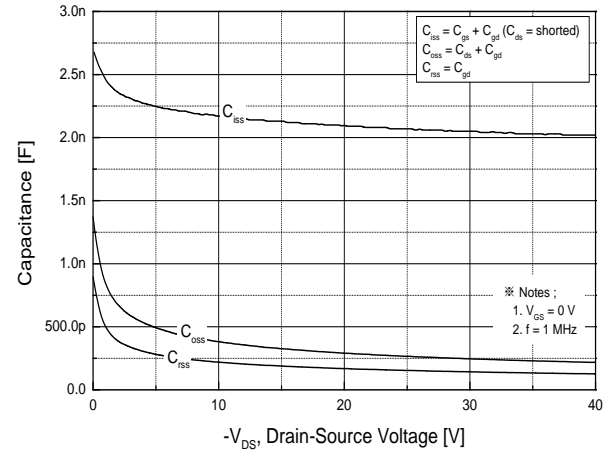
**Fig.5 Transfer Characteristics**



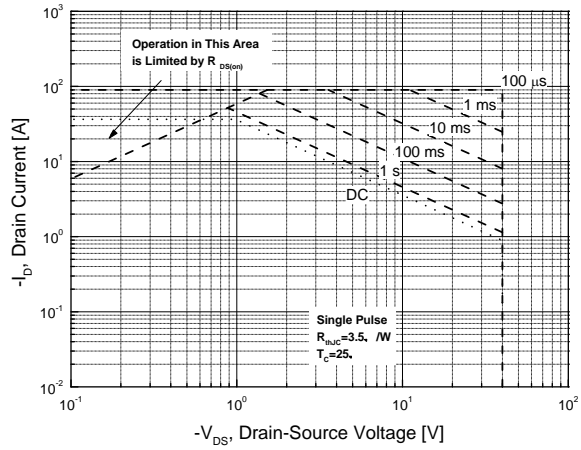
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



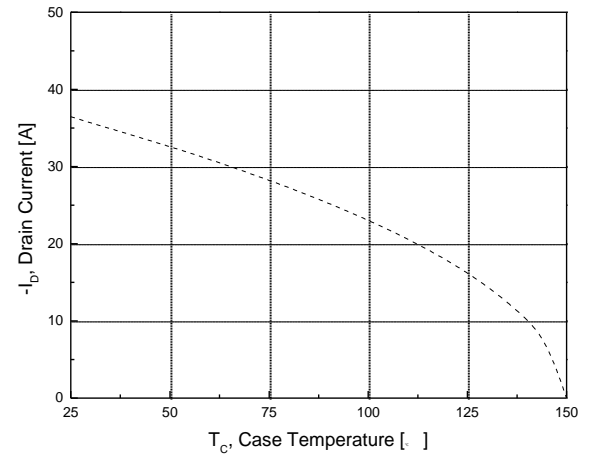
**Fig.7 Gate Charge Characteristics**



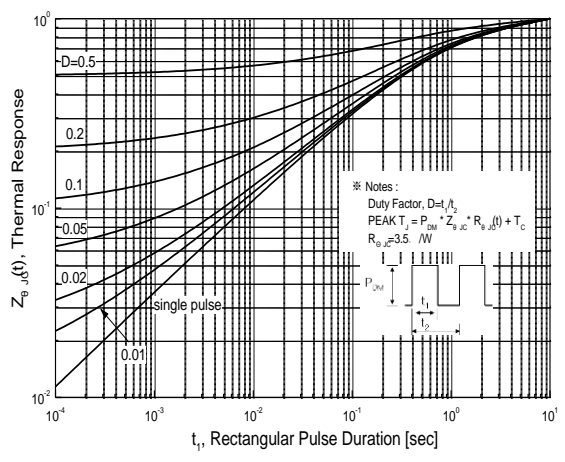
**Fig.8 Capacitance Characteristics**



**Fig.9 Maximum Safe Operating Area**



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

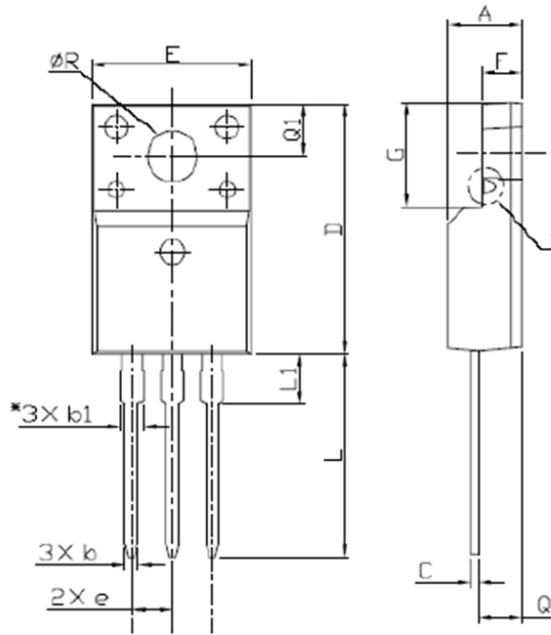


**Fig.11 Transient Thermal Response Curve**

## Physical Dimensions

### 3 Leads, TO-220F

Dimensions are in millimeters unless otherwise specified



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	-
F	2.34	-	2.84
G	6.48	-	6.90
L	12.50	-	13.72
L1	2.79	-	3.67
Q	2.52	-	2.96
Q1	3.10	-	3.50
$\phi R$	3.00	-	3.55

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