

### General Description

The MDF3752TH uses advanced Magnachip's Trench MOSFET Technology to provided high performance in on-state resistance, switching performance and reliability.

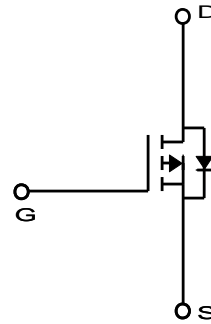
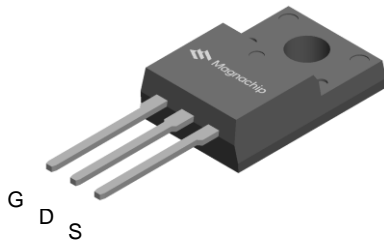
Low  $R_{DS(ON)}$ , Low Gate Charge can be offering superior benefit in the application.

### 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 (Note 1)	$T_C = 25^\circ C$	$I_D$	-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 (Note 2)		$E_{AS}$	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

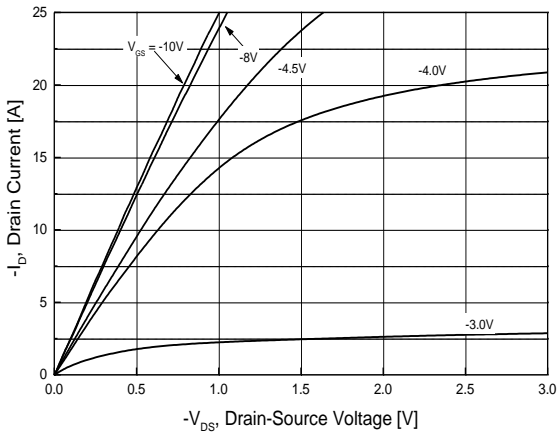
Part Number	Temp. Range	Package	Packing	RoHS Status
MDF3752TH	-55~150°C	TO-220F	Tube	Halogen Free

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

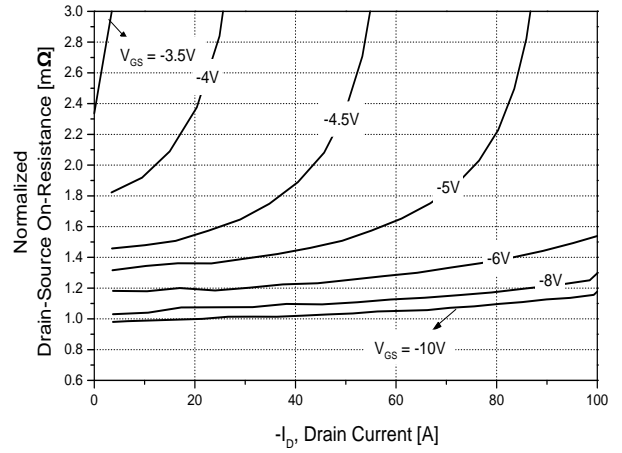
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V	-40	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.0	-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	
Gate resistance	R <sub>G</sub>	F=1MHz	-	4.8	-	Ω
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 :

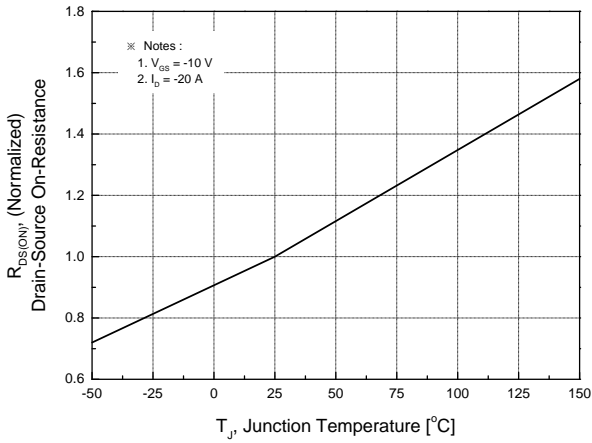
- P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C, P<sub>D</sub>(T<sub>C</sub>=25°C) is based on R<sub>θJC</sub>.
- Starting T<sub>J</sub>=25°C, L=1mH, I<sub>AS</sub>=-16A V<sub>DD</sub>=-20V, V<sub>GS</sub>=-10V



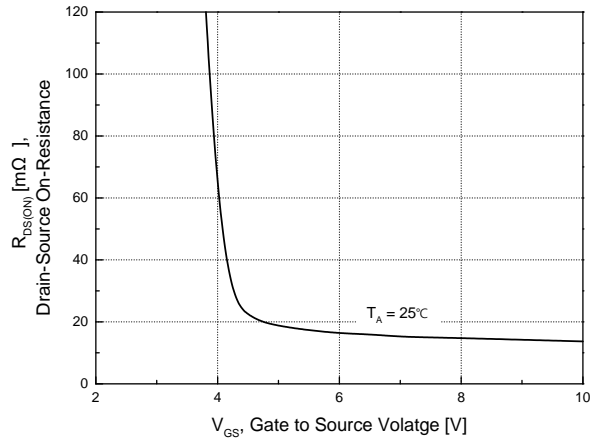
**Fig.1 On-Region Characteristics**



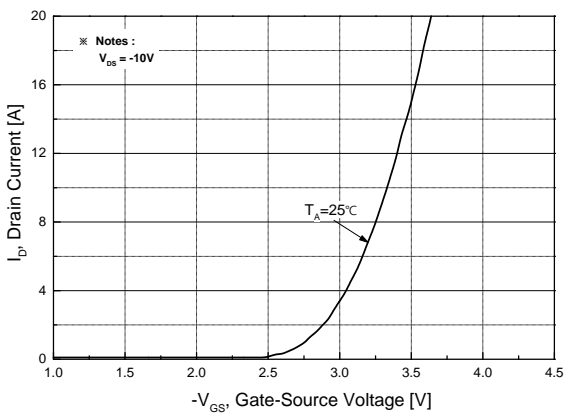
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



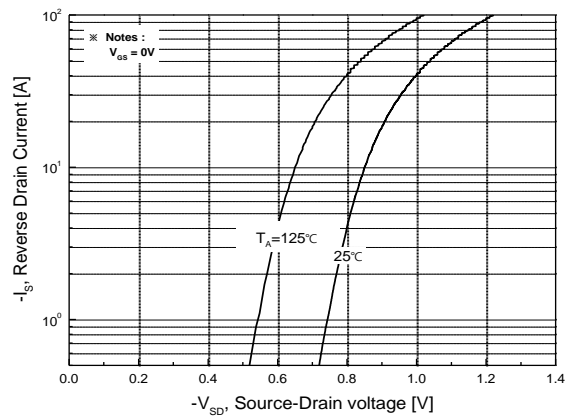
**Fig.3 On-Resistance Variation with Temperature**



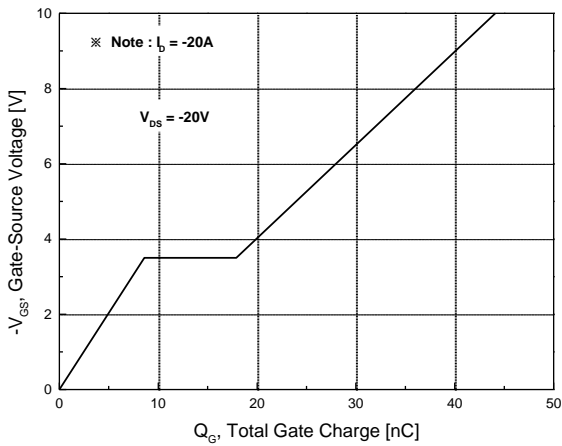
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



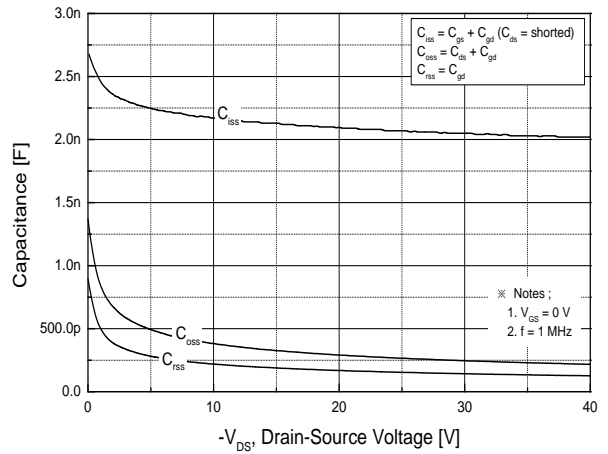
**Fig.5 Transfer Characteristics**



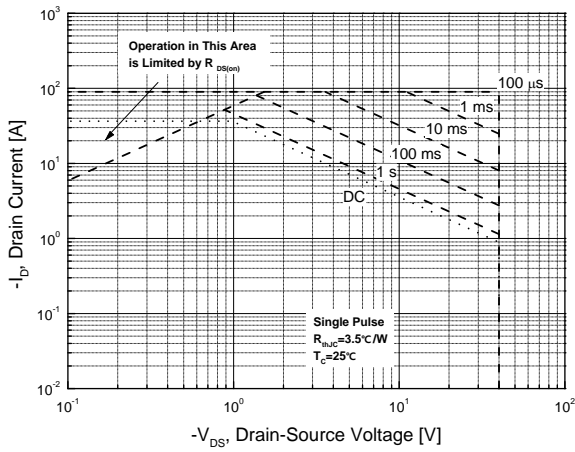
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



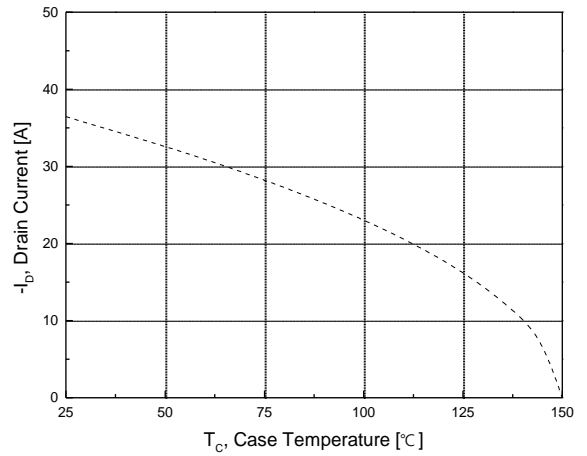
**Fig.7 Gate Charge Characteristics**



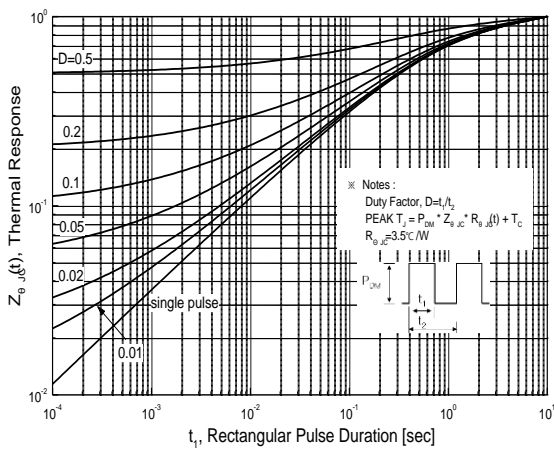
**Fig.8 Capacitance Characteristics**



**Fig.9 Maximum Safe Operating Area**



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

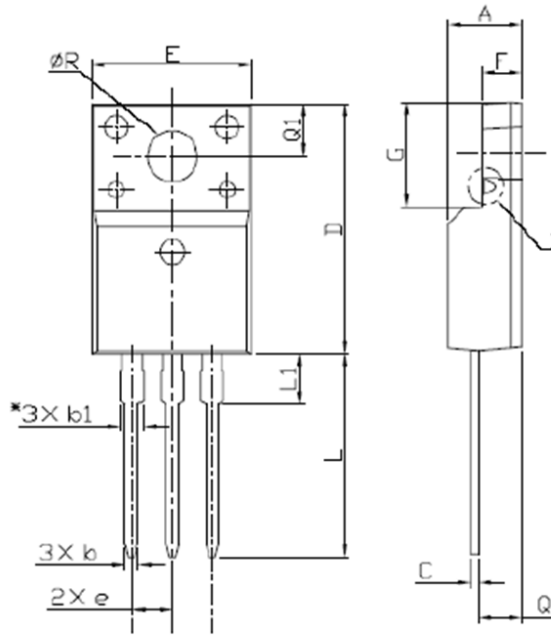


**Fig.11 Transient Thermal Response Curve**

## 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

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

**DISCLAIMER:**

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

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