RoHS Compliant
HALOGEN-FREE

Magnachip

MDF1752
N-Channel Trench MOSFET 40V, 50A, 8.0mΩ

General Description

The MDF1752 uses advanced Magnachip's trench MOSFET Technology to provide high performance in on-state resistance, switching performance and reliability
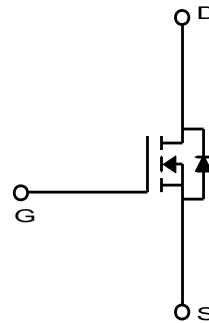
Low $R_{DS(ON)}$, low gate charge can be offering superior benefit in the application.

Features

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

Applications

- Inverters
- General purpose applications

G D S

Absolute Maximum Ratings ($T_C = 25°C$ unless otherwise noted)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 1)	$T_C=25°C$ (a)	I_D	50	A
	$T_C=100°C$		31.8	
	$T_A=25°C$ (b)		12.6	
	$T_A=100°C$		8.0	
Pulsed Drain Current		I_{DM}	100	A
Power Dissipation for Single Operation	$T_C=25°C$	P_D	32	W
	$T_C=100°C$		12.8	
	$T_A=25°C$		2	
	$T_A=100°C$		0.8	
Single Pulse Avalanche Energy (Note 2)		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	$R_{θJA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case	$R_{θJC}$	3.9	

Ordering Information

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

Electrical Characteristics (T$_J$ =25ºC unless otherwise noted)

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

Note :

1. P$_D$ is based on T$_{J(MAX)}$=150°C
   a. P$_D$ (T$_C$=25˚C) is based on R$_{θJC}$,
   b. P$_D$ (T$_A$=25˚C) is based on R$_{θJA}$
2. Starting T$_J$=25˚C, L=1mH, I$_{AS}$=17.5A, V$_{DD}$=40V, V$_{GS}$=10V
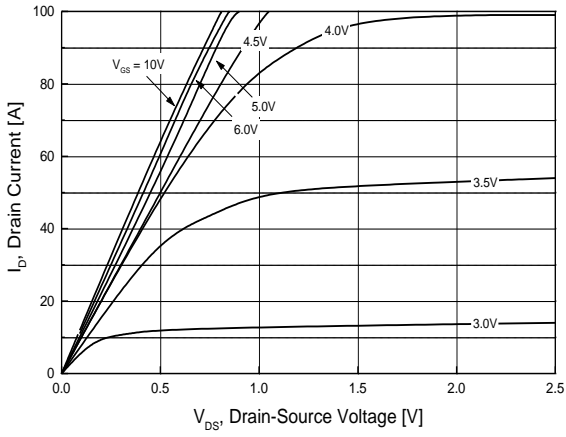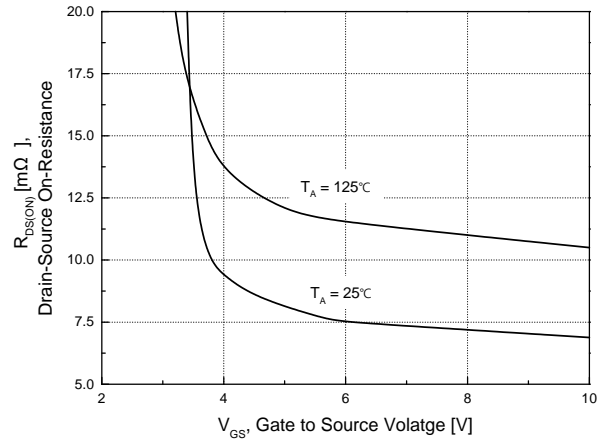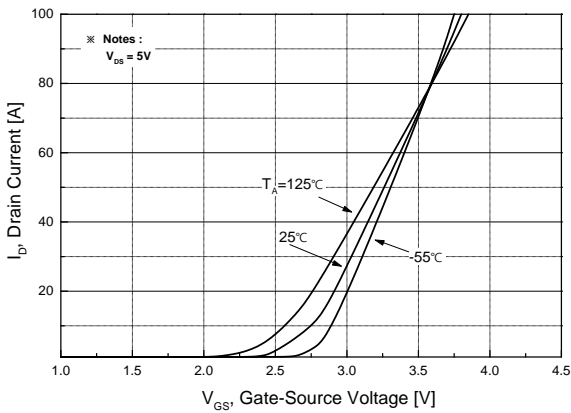
Fig.1 On-Region Characteristics
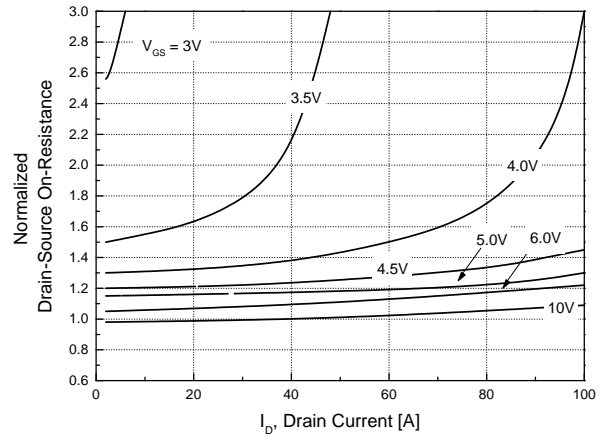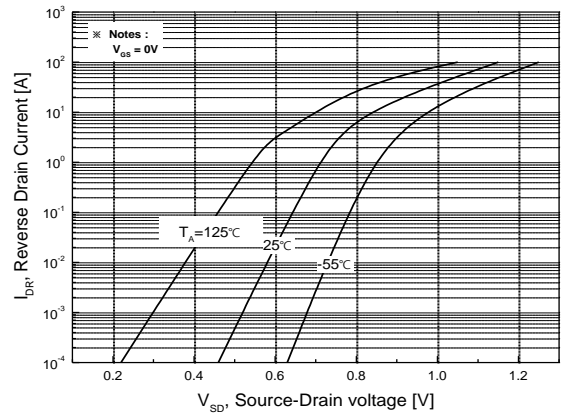

Fig.2 On-Resistance Variation with Drain Current and Gate Voltage
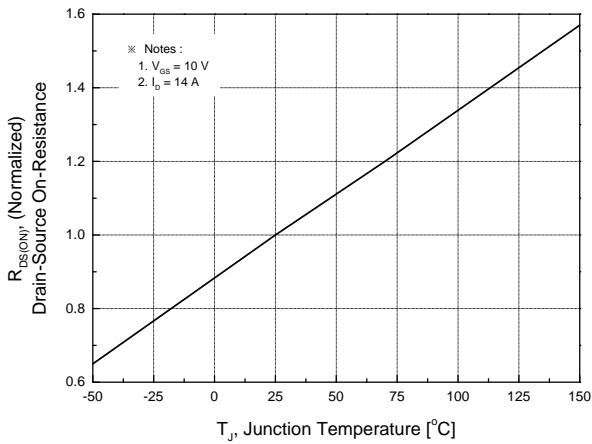
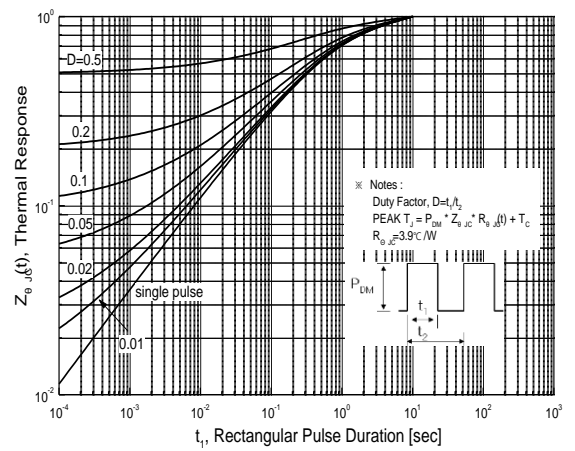**Fig.3 On-Resistance Variation with Temperature**

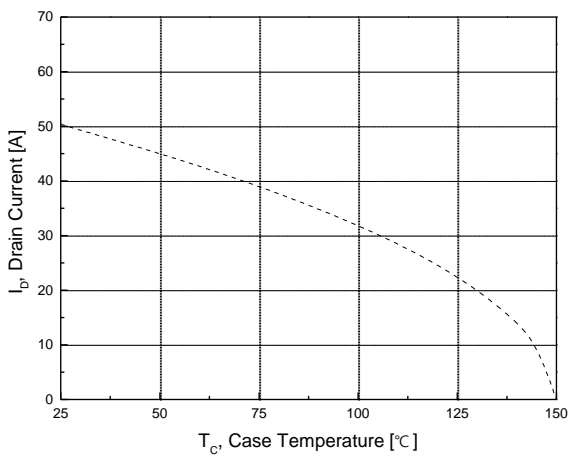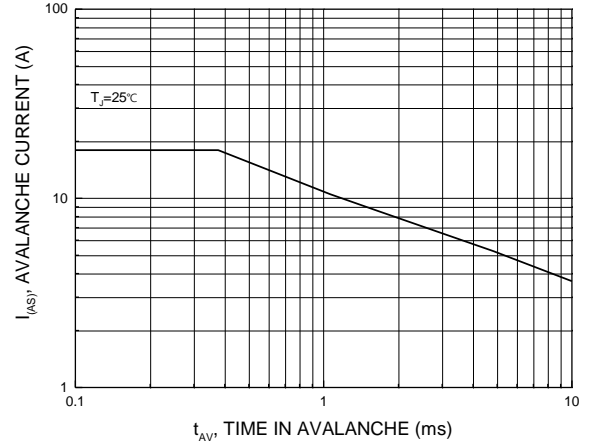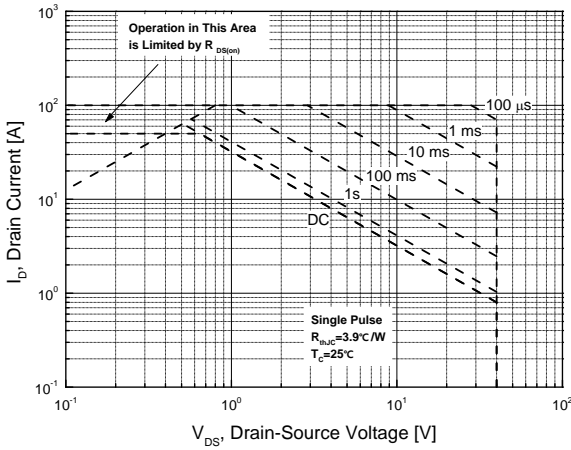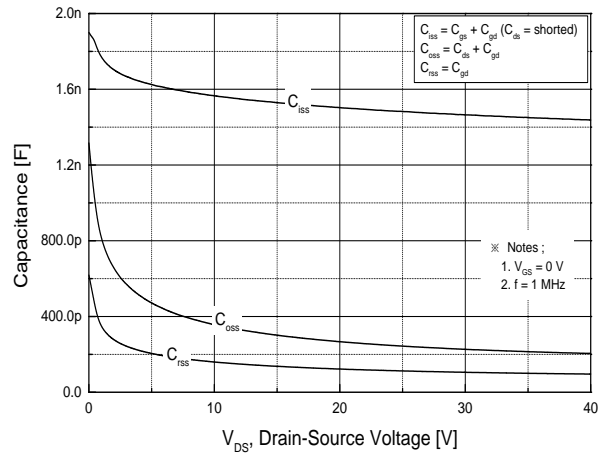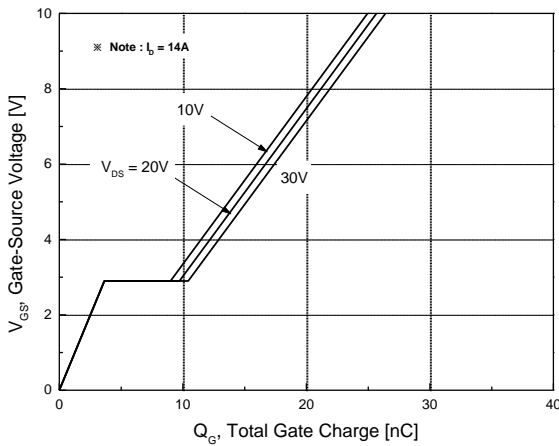**Fig.4 On-Resistance Variation with Gate to Source Voltage**

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 Unclamped Inductive Switching Capability

Fig.11 Maximum Drain Current vs. Case Temperature

Fig.12 Transient Thermal Response Curve

Physical Dimensions

Dimensions are in millimeters unless otherwise specified

TO-220F Package Outline Drawing
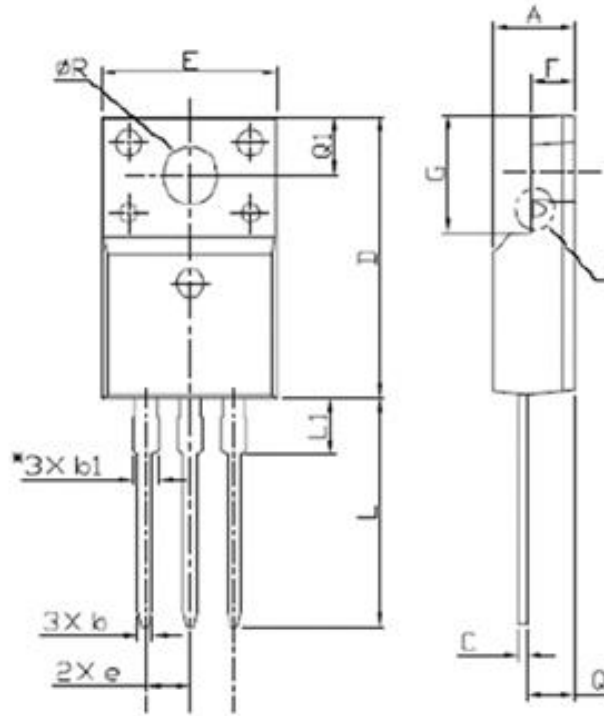
※Note1 : PKG Body Sizes exclude Mold Flash & Gate Burrs

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
øR	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.