RoHS Compliant
HALOGEN-FREE

MagnaChip

MDF3752

P-Channel Trench MOSFET, -40V, -36.5A, 17mΩ

General Description

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

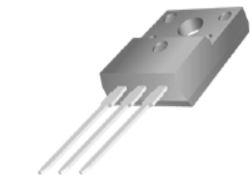
Low $R_{DS(ON)}$, Low Gate Charge can be offering superior benefit in the application.

Features

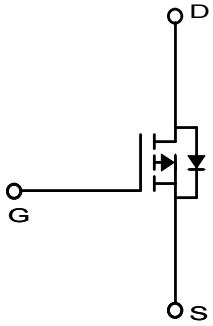
- V_{DS} = -40V
- I_D = -36.5A @V_{GS} = -10V
- $R_{DS(ON)}$
  < 17mΩ @ V_{GS} = -10V
  < 25mΩ @ V_{GS} = -4.5V

Applications

- Inverters
- General purpose applications



G D S



Absolute Maximum Ratings (T_C =25°)

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	I_D	-36.5	A
	T_C=100°C		-23.1	A
Pulsed Drain Current		I_{DM}	-90	A
Power Dissipation	T_C=25°C	P_D	35.7	W
	T_C=100°C		14.3	
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	128	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	°C

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°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_J =25°C 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	-2.0	-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 = -20A	-	13	17	mΩ
		V_{GS} = -4.5V, I_D = -10A		19	25	
Forward Transconductance	g_{FS}	V_{DS} = -10V, I_D = -20A		40	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DD} = -20V, I_D = -20A, V_{GS} = -10V	-	44.1	-	nC
Gate-Source Charge	Q_{gs}		-	8.6	-	
Gate-Drain Charge	Q_{gd}		-	9.3	-	
Input Capacitance	C_{iss}	V_{DS} = -20V, V_{GS} = 0V, f = 1.0MHz	-	2088	-	pF
Reverse Transfer Capacitance	C_{rss}		-	168	-	
Output Capacitance	C_{oss}		-	290	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = -10V ,V_{DD} = -20V, I_D = -1A, R_{GEN}=6.0Ω	-	17.6	-	ns
Turn-On Rise Time	t_r		-	17.8	-	
Turn-Off Delay Time	$t_{d(off)}$		-	59.0	-	
Turn-Off Fall Time	t_f		-	19.8	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = -20A, V_{GS} = 0V	-	-	1.2	V
Reverse Recovery Time	trr	IS = -20A, di/dt=100A/us	-	40	-	ns
Reverse Recovery Charge	Qrr		-	40	-	nC

Note :

1. P_D is based on $T_{J(MAX)}$=150°C, P_D(T_C=25°C) is based on $R_{\Theta JC}$.
2. Starting T_J=25°C, L=1mH, I_{AS}=-16A V_{DD}=-20V, V_{GS}=-10V

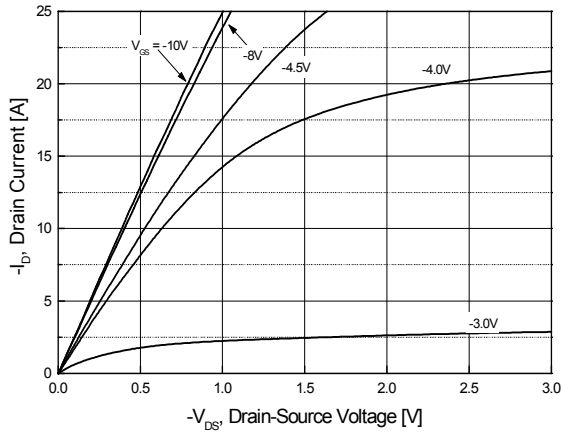


Fig.1 On-Region Characteristics

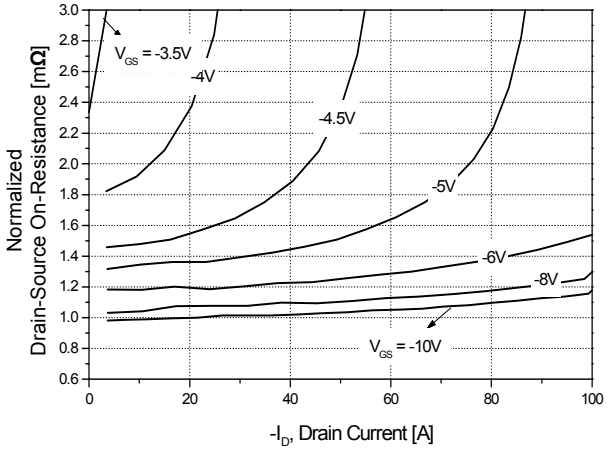


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

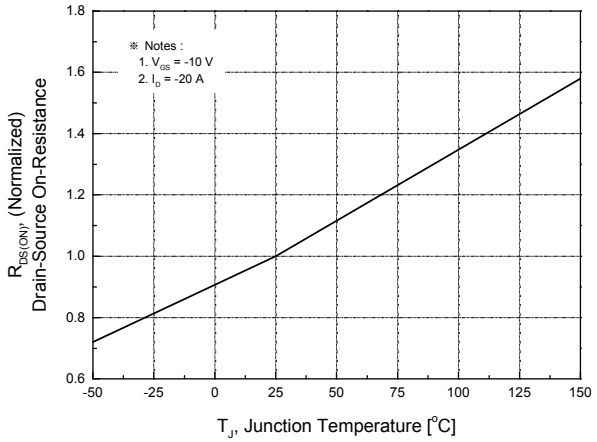


Fig.3 On-Resistance Variation with Temperature

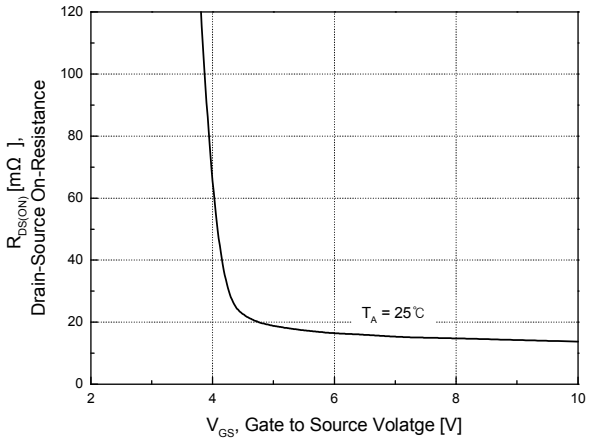


Fig.4 On-Resistance Variation with Gate to Source Voltage

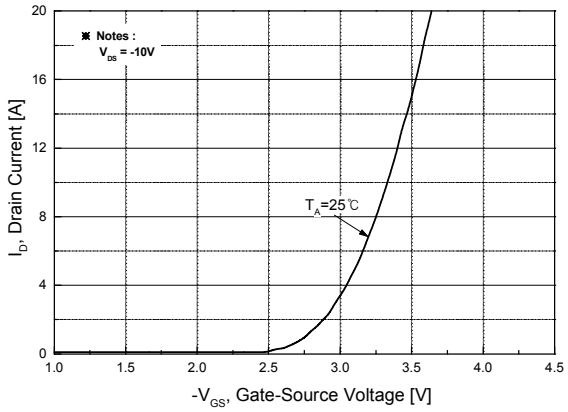


Fig.5 Transfer Characteristics

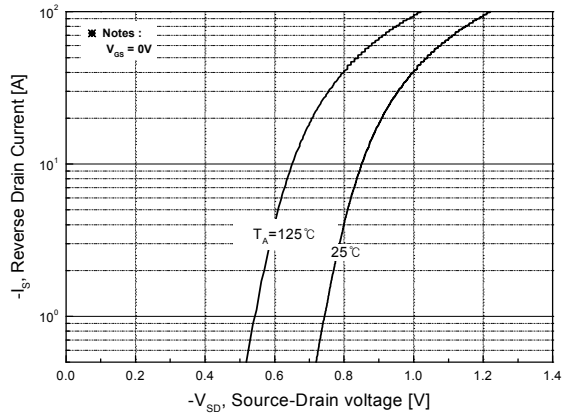


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

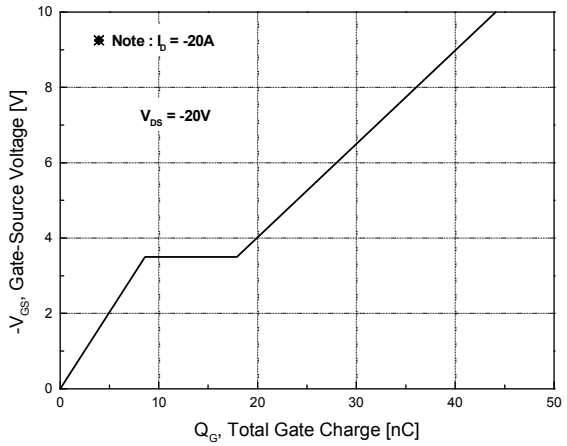


Fig.7 Gate Charge Characteristics

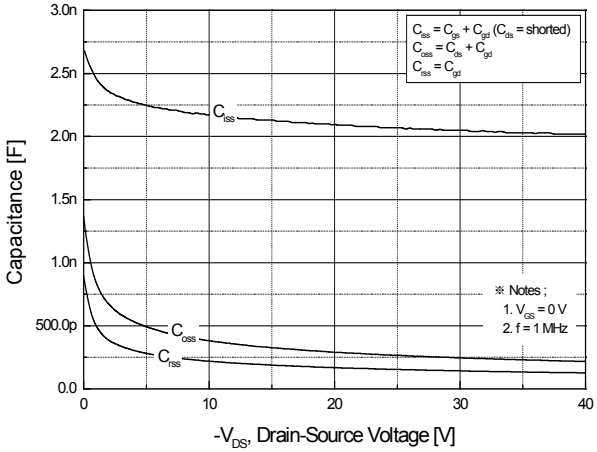


Fig.8 Capacitance Characteristics

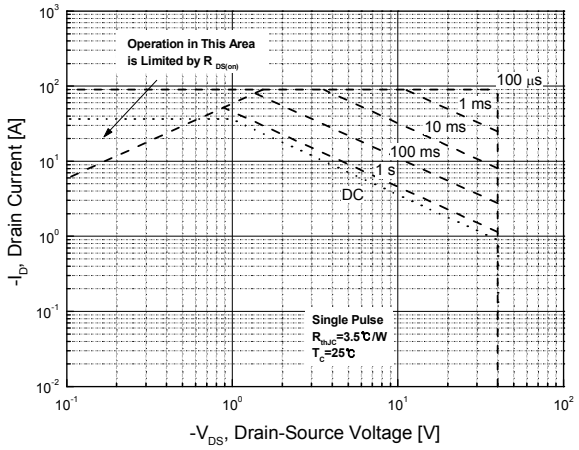


Fig.9 Maximum Safe Operating Area

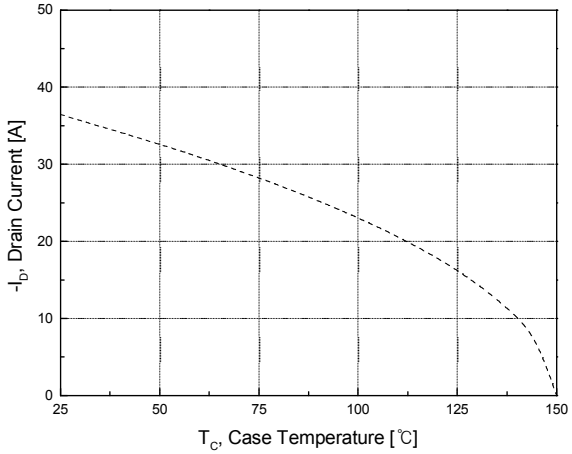


Fig.10 Maximum Drain Current vs. Case Temperature

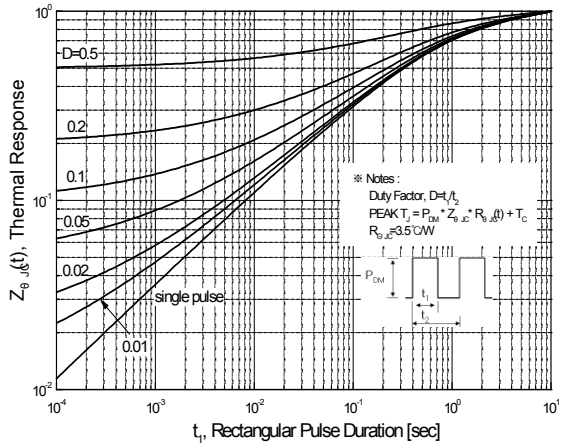
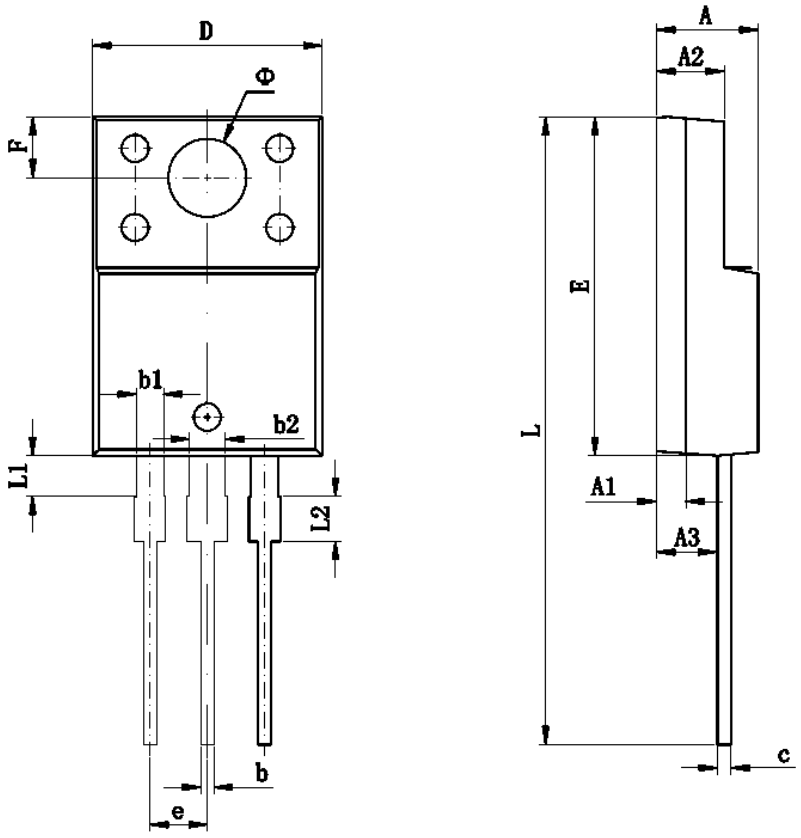


Fig.11 Transient Thermal Response Curve

Physical Dimensions

3 Leads, TO-220F

Dimensions are in millimeters unless otherwise specified



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.300	4.700	0.169	0.185
A1	1.300 REF		0.051 REF	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP		0.100 TYP	
F	2.700 REF		0.106 REF	
Φ	3.500 REF		0.138 REF	
h	0.000	0.300	0.000	0.012
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	1.900	2.100	0.075	0.083

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