

General Description

These N-channel MOSFET are produced using advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

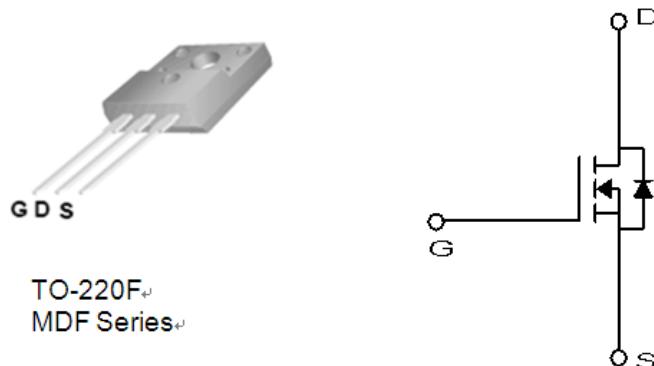
These devices are suitable device for SMPS, high Speed switching and general purpose applications.

Features

- $V_{DS} = 500V$
- $I_D = 11.5A$ @ $V_{GS} = 10V$
- $R_{DS(ON)} \leq 0.75\Omega$ @ $V_{GS} = 10V$

Applications

- Power Supply
- PFC
- High Current, High Speed Switching



Absolute Maximum Ratings ($T_a = 25^\circ C$)

Characteristics		Symbol	MDP12N50	MDF12N50	Unit
Drain-Source Voltage		V_{DSS}	500		V
Gate-Source Voltage		V_{GSS}		± 30	V
Continuous Drain Current	$T_c=25^\circ C$	I_D	.11.5	11.5*	A
	$T_c=100^\circ C$		7.0	7.0*	A
Pulsed Drain Current ⁽¹⁾		I_{DM}	46	46*	A
Power Dissipation	$T_c=25^\circ C$	P_D	165	42	W
	Derate above 25 °C		1.33	0.32	W/°C
Repetitive Avalanche Energy ⁽¹⁾		E_{AR}		16.5	mJ
Peak Diode Recovery dv/dt ⁽³⁾		dv/dt		4.5	V/ns
Single Pulse Avalanche Energy ⁽⁴⁾		E_{AS}		460	mJ
Junction and Storage Temperature Range		T_J, T_{stg}		-55~150	°C

* I_d limited by maximum junction temperature

Thermal Characteristics

Characteristics	Symbol	MDP12N50	MDF12N50	Unit
Thermal Resistance, Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	62.5	62.5	°C/W
Thermal Resistance, Junction-to-Case ⁽¹⁾	$R_{\theta JC}$	0.75	3.0	

Ordering Information

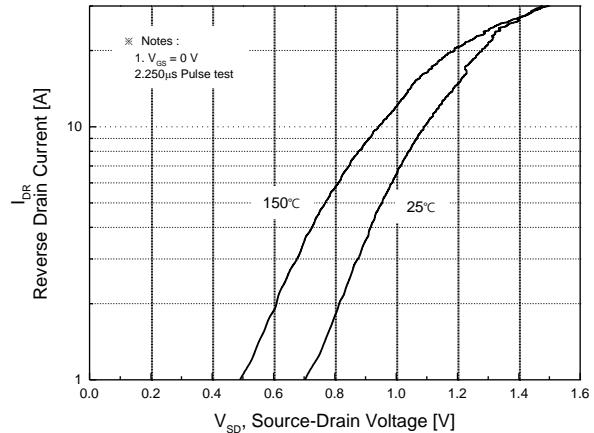
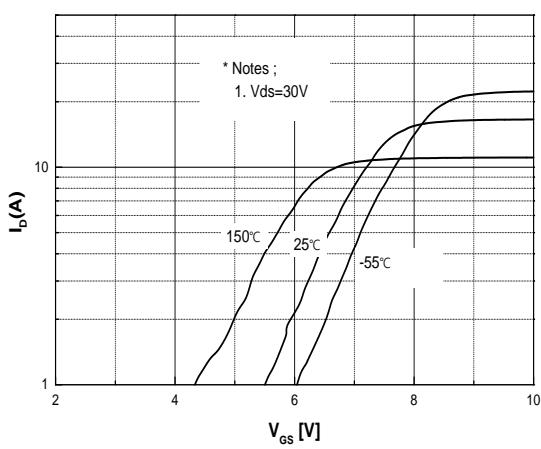
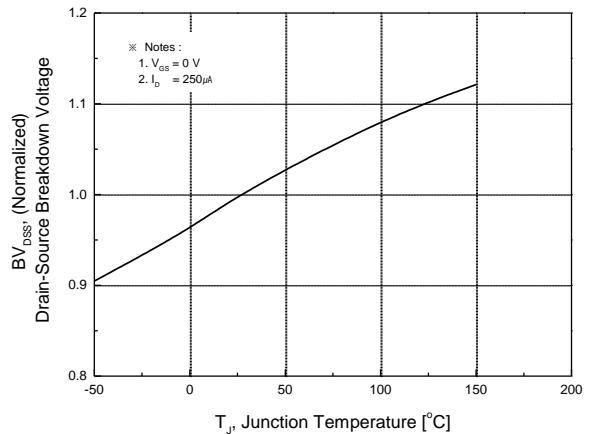
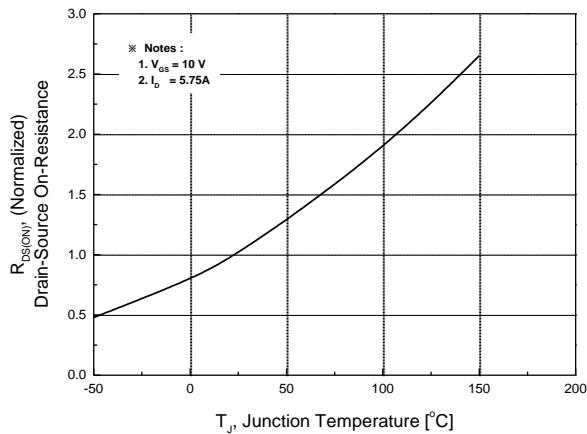
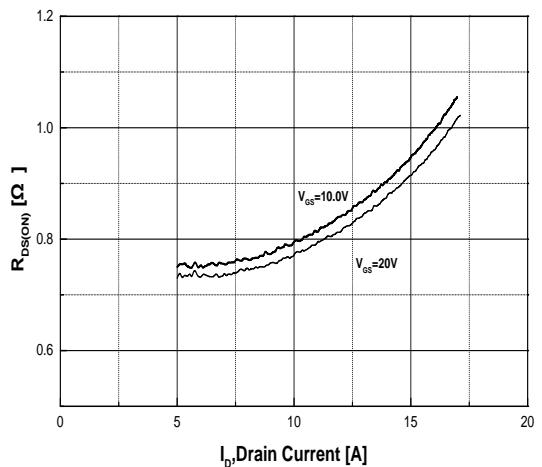
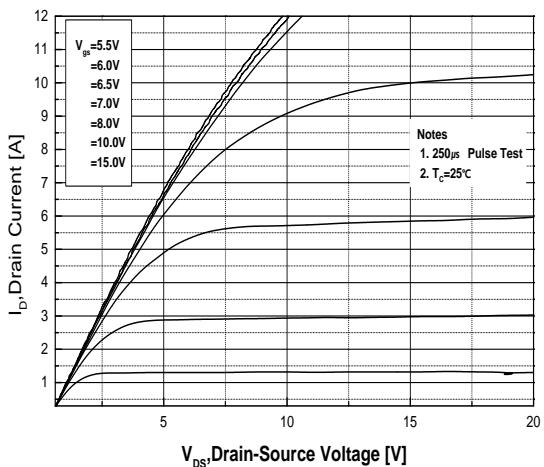
Part Number	Temp. Range	Package	Packing	RoHS Status
MDF12N50FTH	-55~150°C	TO-220F	Tube	Halogen Free

Electrical Characteristics (Ta =25°C)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D = 250μA, V _{GS} = 0V	500	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	2.5	-	4.5	
Drain Cut-Off Current	I _{DSS}	V _{DS} = 500V, V _{GS} = 0V	-	-	10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30V, V _{DS} = 0V	-	-	100	nA
Drain-Source ON Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 5.75A		0.59	0.75	Ω
Forward Transconductance	g _f	V _{DS} = 30V, I _D = 5.75A	-	5	-	S
Dynamic Characteristics						
Total Gate Charge	Q _g	V _{DS} = 400V, I _D = 11.5A, V _{GS} = 10V ⁽³⁾	-	20	26	nC
Gate-Source Charge	Q _{gs}		-	7.0	-	
Gate-Drain Charge	Q _{gd}		-	7.5	-	
Input Capacitance	C _{iss}	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	-	1010	1300	pF
Reverse Transfer Capacitance	C _{rss}		-	2.7	4.0	
Output Capacitance	C _{oss}		-	125	165	
Turn-On Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DS} = 250V, I _D = 11.5A, R _G = 25Ω ⁽³⁾	-	47	100	ns
Rise Time	t _r		-	35	80	
Turn-Off Delay Time	t _{d(off)}		-	55	120	
Fall Time	t _f		-	28	60	
Drain-Source Body Diode Characteristics						
Maximum Continuous Drain to Source Diode Forward Current	I _S	I _S = 11.5A, V _{GS} = 0V	-	11.5	-	A
Source-Drain Diode Forward Voltage	V _{SD}		-		1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 11.5A, dI/dt = 100A/μs ⁽³⁾	-	100		ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	2.61		μC

Note :

1. Pulse width is based on R_{θJC} & R_{θJA} and the maximum allowed junction temperature of 150°C.
2. Pulse test: pulse width≤300us, duty cycle≤2%, pulse width limited by junction temperature T_{J(MAX)}=150°C.
3. I_{SD}≤11.5A, di/dt≤200A/us, V_{DD}=50V, R_g=25Ω, Starting T_J=25°C
4. L=6.3mH, I_{AS}=11.5A, V_{DD}=50V, R_g=25Ω, Starting T_J=25°C



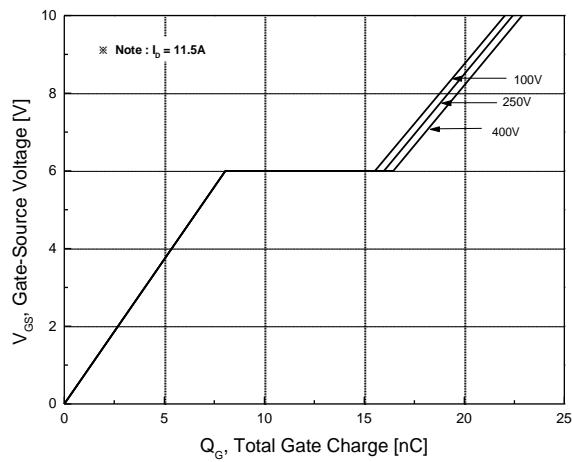


Fig.7 Gate Charge Characteristics

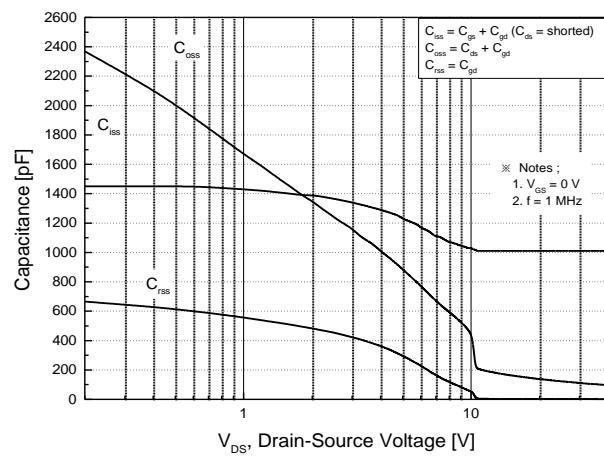


Fig.8 Capacitance Characteristics

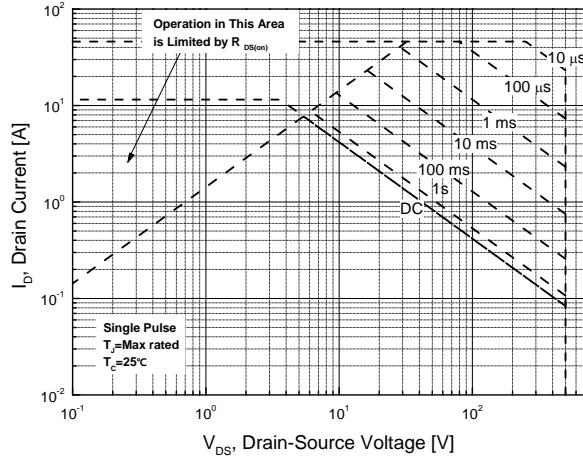


Fig.9 Maximum Safe Operating Area

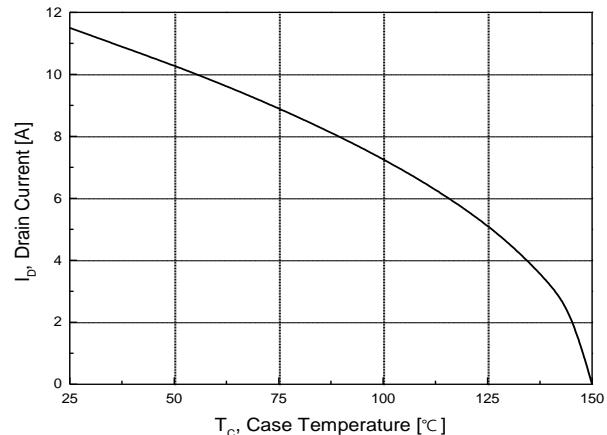


Fig.10 Maximum Drain Current vs. Case Temperature

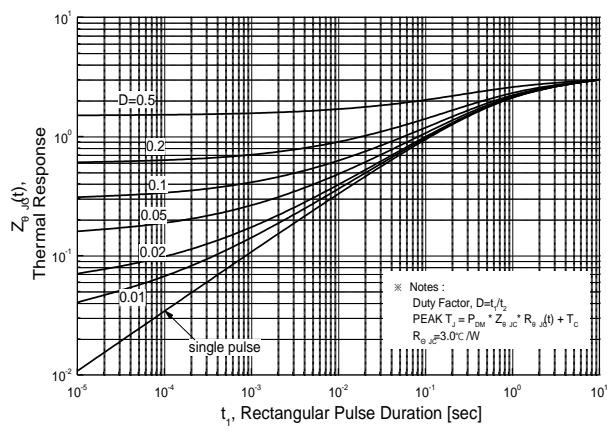


Fig.11 Transient Thermal Response Curve

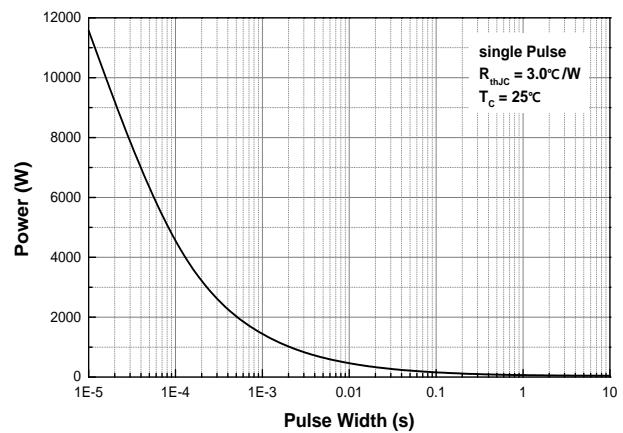
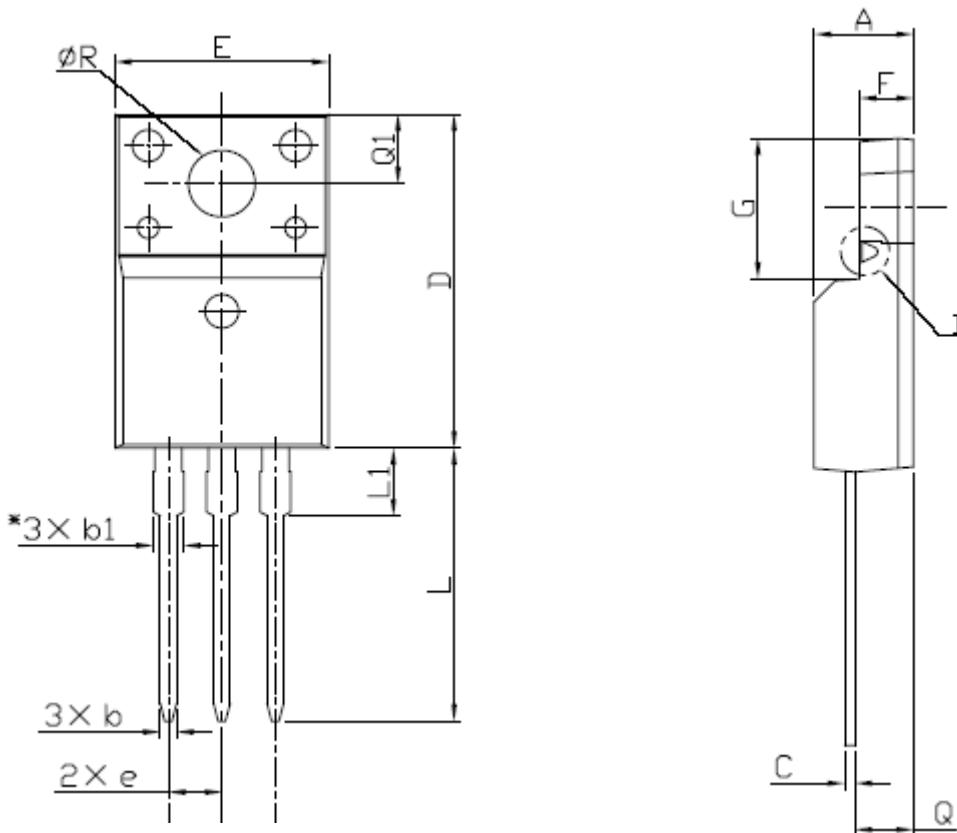


Fig.12 Single Pulse Maximum Power Dissipation

Physical Dimension

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	12.24		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.

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