

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.

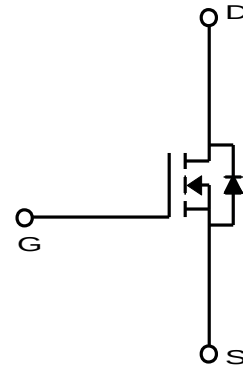
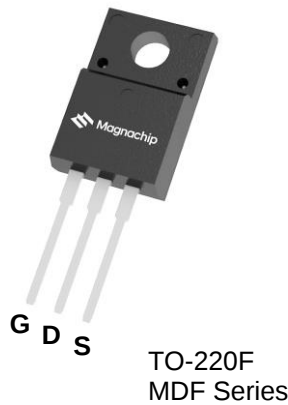
These devices are suitable device for SMPS, high Speed switching and general purpose applications.

Features

- $V_{DS} = 650V$
- $I_D = 14A$ @ $V_{GS} = 10V$
- $R_{DS(ON)} \leq 0.46\Omega$ @ $V_{GS} = 10V$

Applications

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



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

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current	$T_C = 25^\circ C$	I_D	14*	A
	$T_C = 100^\circ C$		8.8*	A
Pulsed Drain Current ⁽¹⁾		I_{DM}	56*	A
Power Dissipation	$T_C = 25^\circ C$	P_D	36.7	W
	Derate above $25^\circ C$		0.29	W/ $^\circ C$
Repetitive Avalanche Energy ⁽¹⁾		E_{AR}	23.1	mJ
Peak Diode Recovery dv/dt ⁽³⁾		dv/dt	4.5	V/ns
Single Pulse Avalanche Energy ⁽⁴⁾		E_{AS}	800	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	$^\circ C$

* I_D limited by maximum junction temperature

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	62.5	$^\circ C/W$
Thermal Resistance, Junction-to-Case ⁽¹⁾	$R_{\theta JC}$	3.4	

Ordering Information

Part Number	Marking	Temp. Range	Package	Packing	RoHS Status
MDF13N65BTH	MDF13N65B	-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}	$I_D = 250\mu A, V_{GS} = 0V$	650	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	
Drain Cut-Off Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$	-	-	1	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 7A$		0.40	0.46	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 30V, I_D = 7A$	-	3.7	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 520V, I_D = 14.0A, V_{GS} = 10V^{(3)}$	-	54	-	nC
Gate-Source Charge	Q_{gs}		-	13	-	
Gate-Drain Charge	Q_{gd}		-	21	-	
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	2400	-	pF
Reverse Transfer Capacitance	C_{rss}		-	12.8	-	
Output Capacitance	C_{oss}		-	243	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 325V, I_D = 14.0A, R_G = 25\Omega^{(3)}$	-	32	-	nS
Rise Time	t_r		-	81	-	
Turn-Off Delay Time	$t_{d(off)}$		-	204	-	
Fall Time	t_f		-	76	-	
Drain-Source Body Diode Characteristics						
Maximum Continuous Drain to Source Diode Forward Current	I_S		-	14	-	A
Source-Drain Diode Forward Voltage	V_{SD}	$I_S = 14.0A, V_{GS} = 0V$	-		1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 14.A, di/dt = 100A/\mu s^{(3)}$	-	377	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	8.2	-	μC

Note :

1. Pulse width is based on $R_{\theta JC}$ & $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.
2. Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ C$.
3. $I_{SD} \leq 7.0A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$
4. $L = 7.6mH$, $I_{AS} = 14.0A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$,

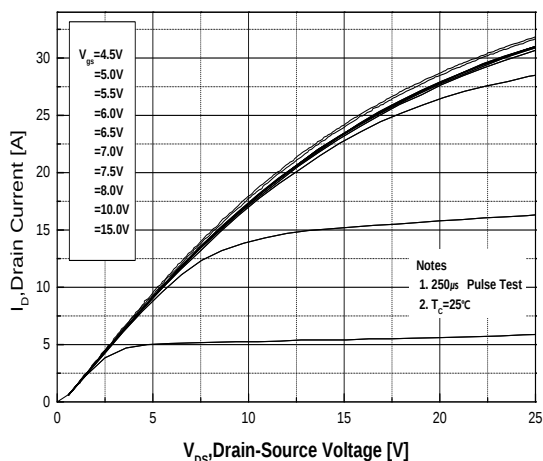


Fig.1 On-Region Characteristics

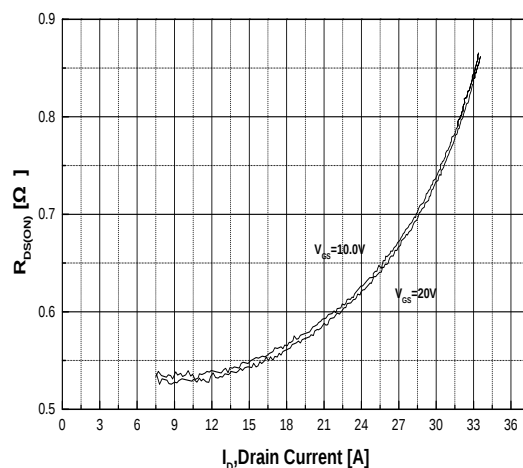


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

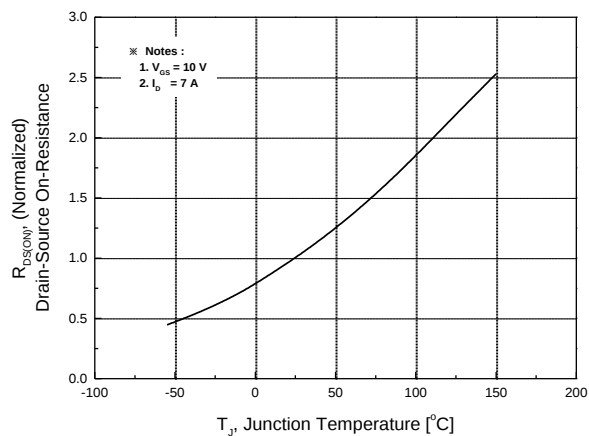


Fig.3 On-Resistance Variation with Temperature

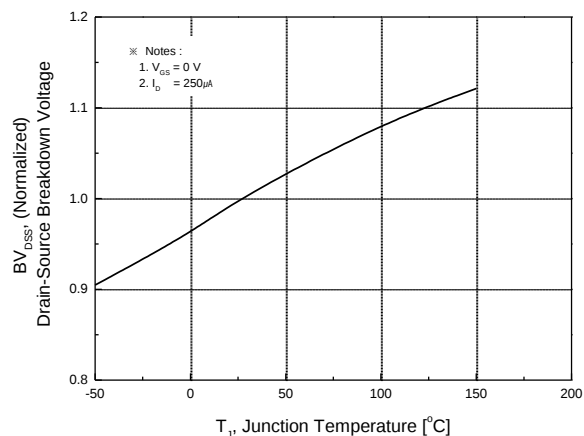


Fig.4 Breakdown Voltage Variation vs. Temperature

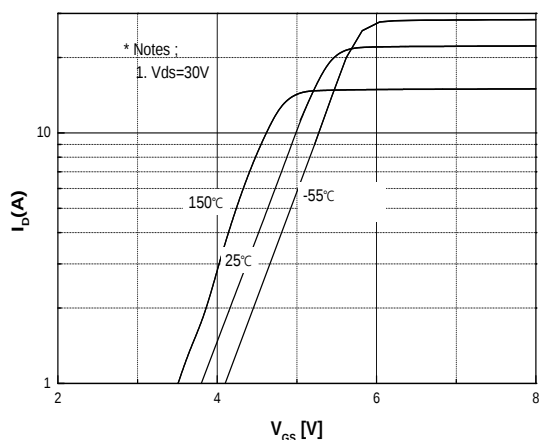


Fig.5 Transfer Characteristics

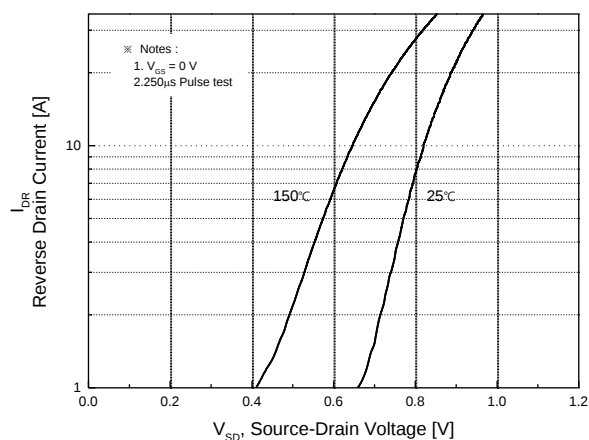
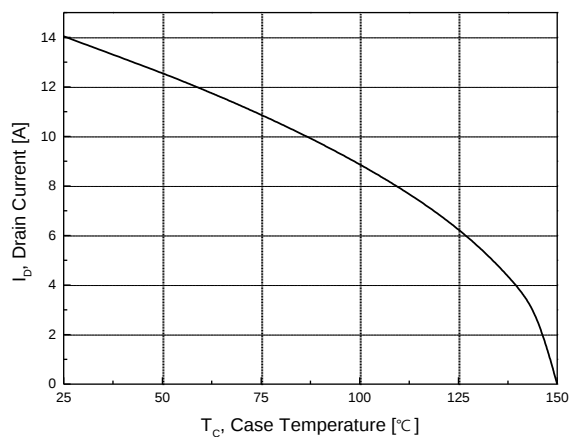
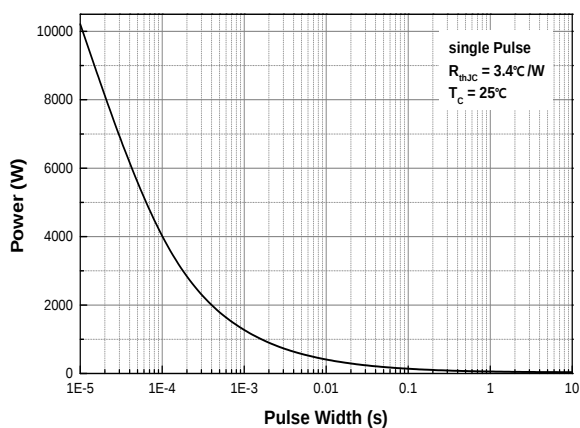
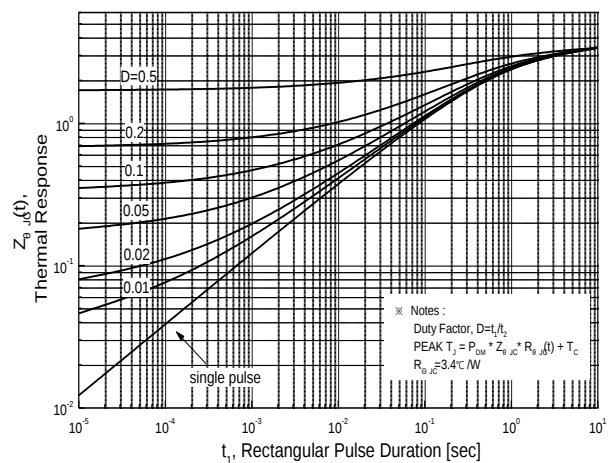
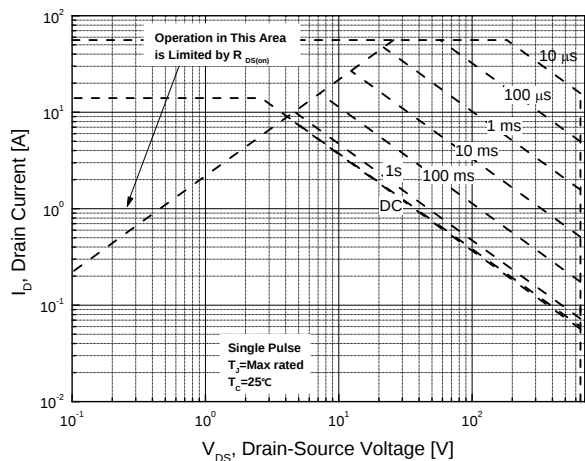
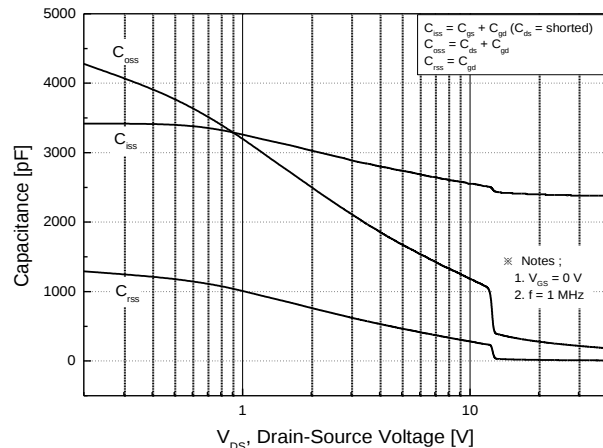
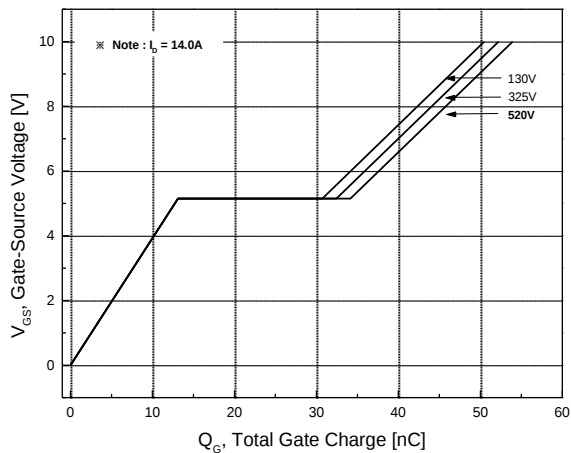


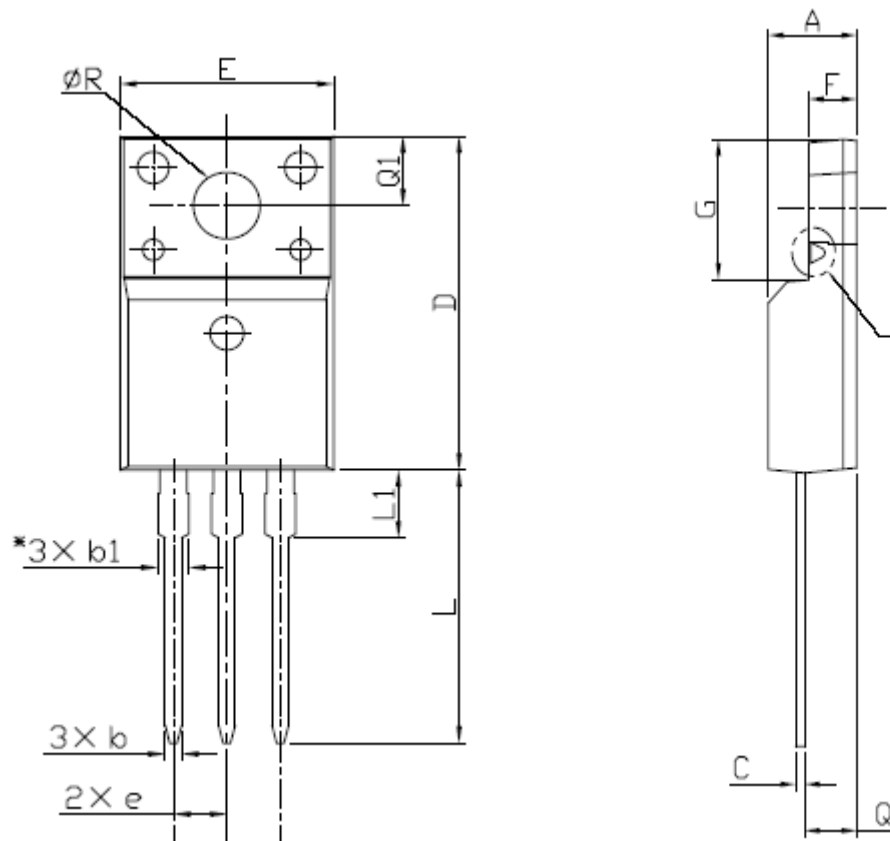
Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature



Physical Dimensions

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

DISCLAIMER:

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