RoHS Compliant
HALOGEN-FREE

MagnaChip

MDF11N60

N-Channel MOSFET 600V, 11A, 0.55Ω

General Description

The MDF11N60 uses advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

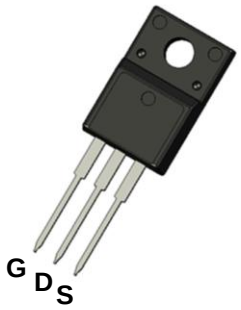
MDF11N60 is suitable device for SMPS, high Speed switching and general purpose applications.

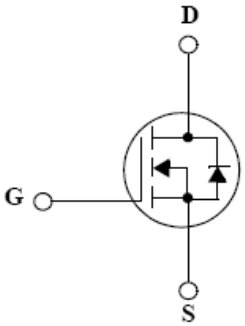
Features

- V_{DS} = 600V
- V_{DS} = 660V @ T_{jmax}
- I_D = 11A @ V_{GS} = 10V
- $R_{DS(ON)}$ ≤ 0.55Ω @ V_{GS} = 10V

Applications

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





Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	600	V
Drain-Source Voltage @ Tjmax		V_{DSS} @ T_{jmax}	660	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current (※)	T_C=25°C	I_D	11	A
	T_C=100°C		6.9	A
Pulsed Drain Current[1]		I_{DM}	44	A
Power Dissipation	T_C=25°C	P_D	49	W
	Derate above 25 °C		0.39	W/°C
Peak Diode Recovery dv/dt[3]		dv/dt	4.5	V/ns
Single Pulse Avalanche Energy[4]		E_{AS}	720	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	°C

※ Id limited by maximum junction temperature

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient[1]	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case[1]	$R_{\theta JC}$	2.55	

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Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDF11N60TH	-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	600	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	3.0	-	5.0	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V	-	-	1	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 = 5.5A	-	0.45	0.55	Ω
Forward Transconductance	g_{fs}	V_{DS} = 30V, I_D = 5.5A	-	13	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = 480V, I_D = 11A, V_{GS} = 10V(3)	-	38.4	-	nC
Gate-Source Charge	Q_{gs}		-	11.2	-	
Gate-Drain Charge	Q_{gd}		-	14	-	
Input Capacitance	C_{iss}	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	-	1700	-	pF
Reverse Transfer Capacitance	C_{rss}		-	6.2	-	
Output Capacitance	C_{oss}		-	184	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 300V, I_D = 11A, R_G = 25Ω(3)	-	38	-	ns
Rise Time	t_r		-	50	-	
Turn-Off Delay Time	$t_{d(off)}$		-	76	-	
Fall Time	t_f		-	33	-	
Drain-Source Body Diode Characteristics						
Maximum Continuous Drain to Source Diode Forward Current	I_S		-	11	-	A
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 11A, V_{GS} = 0V	-	-	1.4	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 11A, dI/dt = 100A/μs(3)	-	430	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	4.0	-	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 ≤300us, duty cycle≤2%, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
3. I_{SD} ≤11A, di/dt≤200A/us, V_{DD}=50V, R_g =25Ω, Starting T_J=25°C
4. L=10.9mH, I_{AS}=11A, V_{DD}=50V, R_g =25Ω, Starting T_J=25°C

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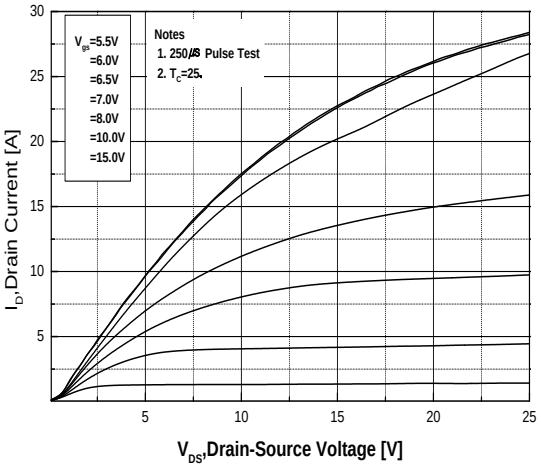


Fig.1 On-Region Characteristics

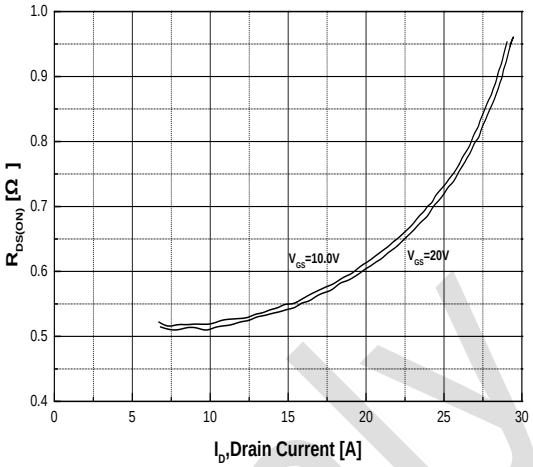


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

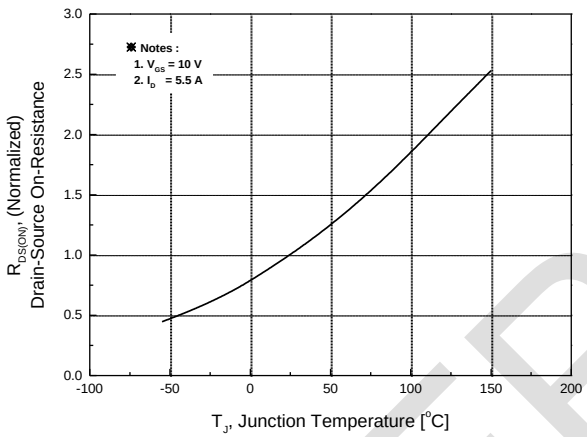


Fig.3 On-Resistance Variation with Temperature

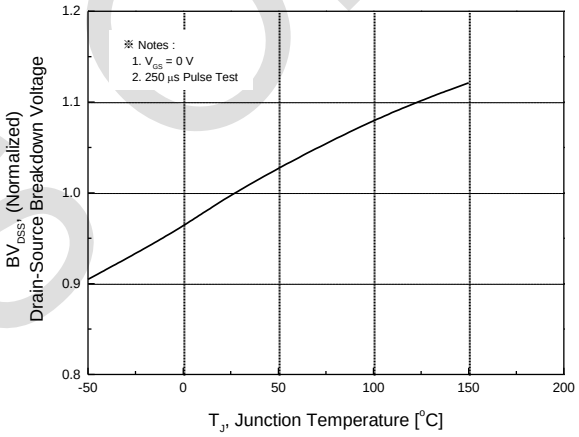


Fig.4 Breakdown Voltage Variation vs. Temperature

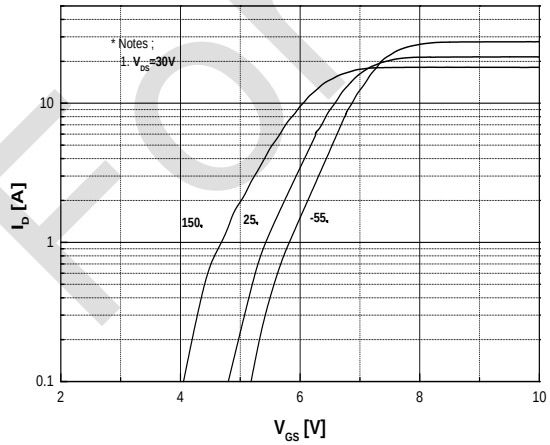


Fig.5 Transfer Characteristics

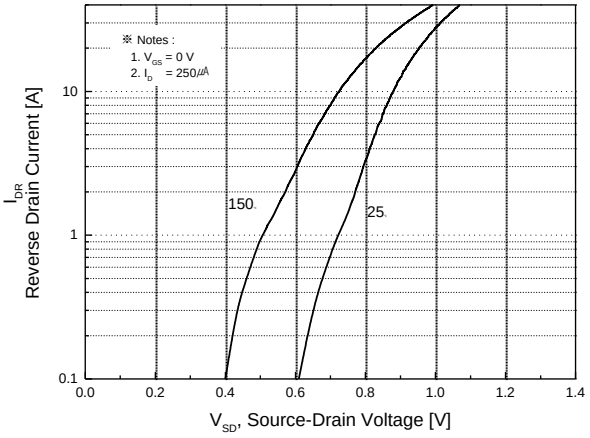


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

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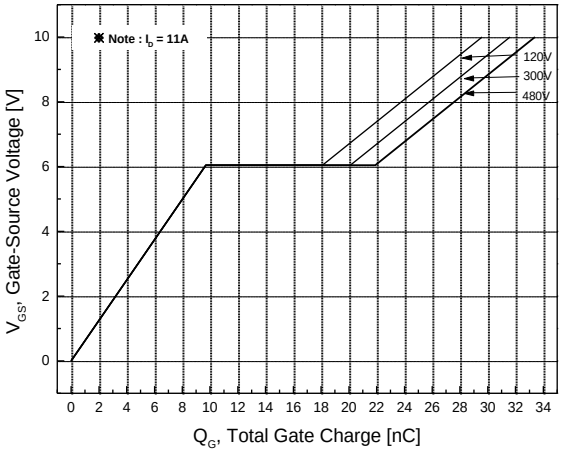


Fig.7 Gate Charge Characteristics

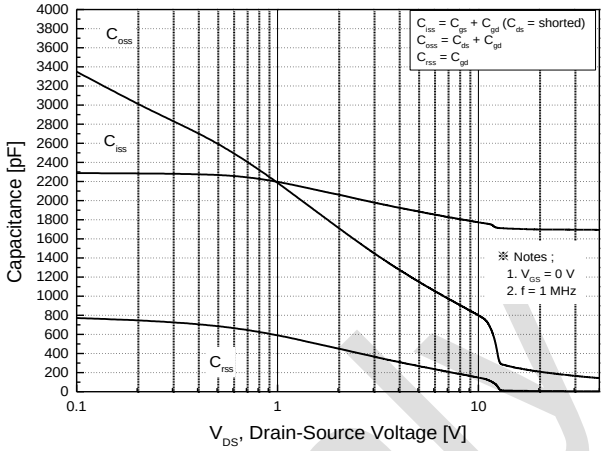


Fig.8 Capacitance Characteristics

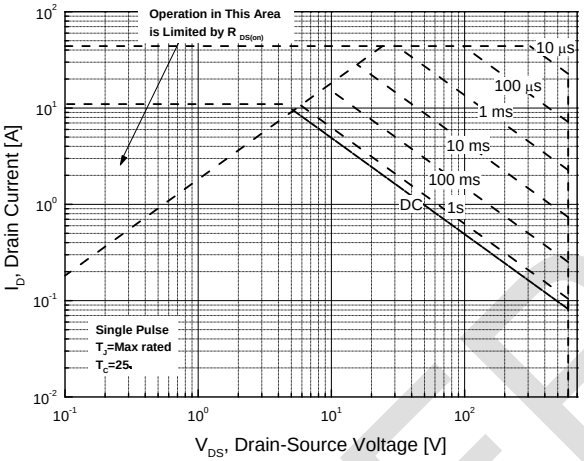


Fig.9 Maximum Safe Operating Area

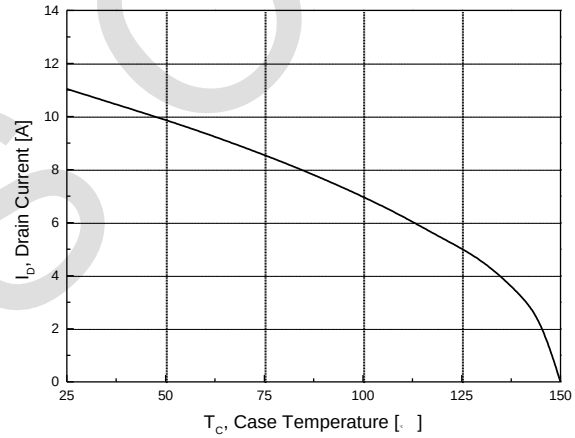


Fig.10 Maximum Drain Current vs. Case Temperature

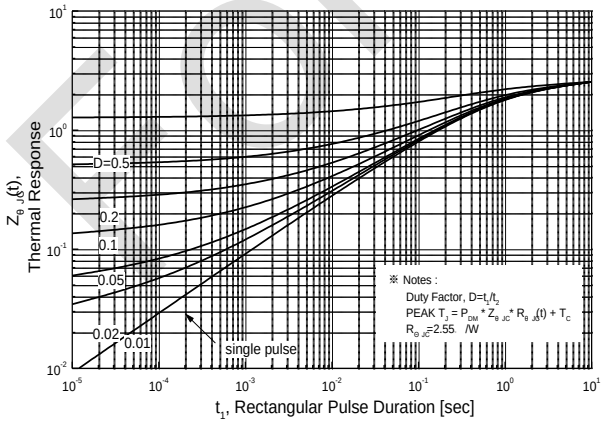


Fig.11 Transient Thermal Response Curve

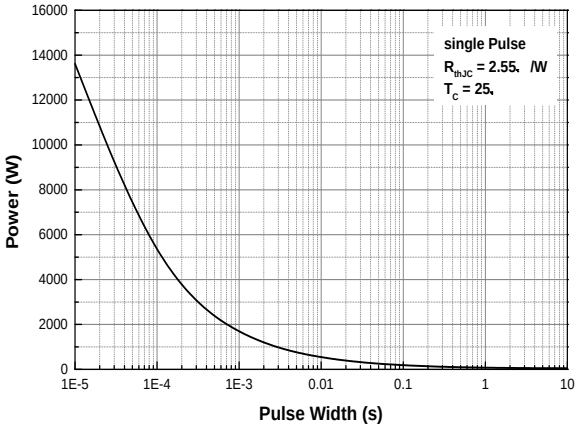


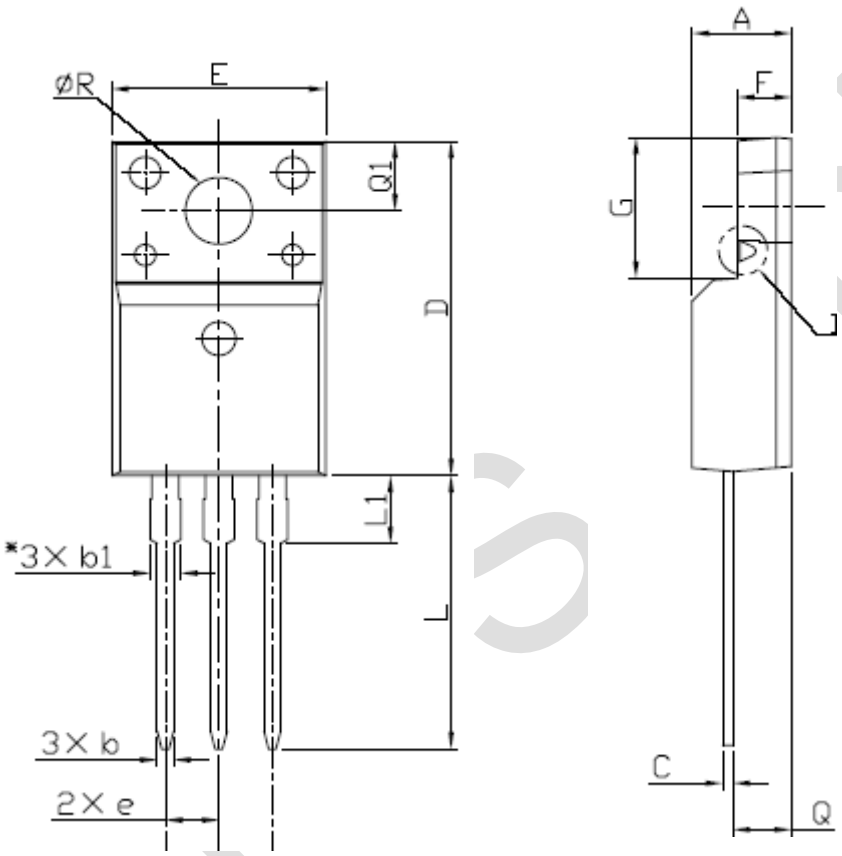
Fig.12 Single Pulse Maximum Power Dissipation

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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	12.24		13.72
L1	2.79		3.67
Q	2.52		2.96
Q1	3.10		3.50
ØR	3.00		3.55

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