MDF10N055TH

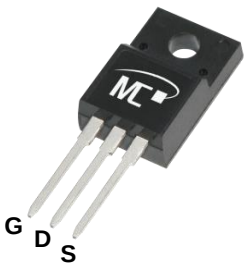
Single N-channel Trench MOSFET 100V 5.5mΩ 80A

General description

The MDF10N055TH uses advanced MagnaChip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance, and excellent quality.

These devices can also be utilized in industrial applications such as Synchronous Rectification and general Purpose applications.

TO-220F



Top View

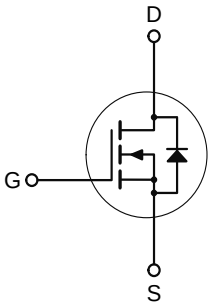
Bottom View

Features and benefits

- **MagnaChip's MOSFET Technology**
- **Very low on-resistance $R_{DS(on)}$**
- **100% Avalanche / Rg Tested**

Applications

- **Specifically for Syncronous Rectification**
- **Switching Applications**



Key performance parameters

V_{DS}	100	V
$R_{DS(on),\ max}$	0.0055	Ω
I_D	80	A
Q_G	85	nC
Junction temperature, max	175	°C

RoHS Compliant

RoHS Compliant
HALOGEN-FREE

Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDF10N055TH	TO-220F	10N055	Tube	Halogen Free

http://www.magnachip.com/powersolutions

MX LISTED NYSE

Maximum ratings, at T_A = 25°C, unless otherwise specified

Parameter		Symbol	Rating	Unit
Drain-source Voltage		V_{DS}	100	V
Gate-source Voltage		V_{GS}	± 20	V
1) Drain current	Tc=25°C Silicon Limited	I_D	123	A
	Tc=25°C Package Limited		80	A
	Tc=100°C Silicon Limited		87	A
2) Pulsed drain current	Tc=25°C	I_{DM}	320	A
Total power dissipation	Tc=25°C	P_{tot}	188	W
	Tc=100°C		94	W
3) Avalanche energy, single pulse		E_{AS}	288	mJ
Operating and storage temperature		T_j, T_{stg}	- 55 ~ 175	°C

Thermal characteristics

Parameter	Symbol	Rating	Unit
1) Thermal resistance, junction - case	$R_{\theta JC}$	0.8	K/W
Thermal resistance, junction - ambient	$R_{\theta JA}$	62.5	K/W

Notes

1. Surface mounted FR-4 board by JEDEC (jesd51-7)
2. Pulse width limited by Tjmax
3. EAS is tested at starting Tj = 25℃, L = 1.0mH, I_{AS} = 24A, V_{DD} = 50V, V_{GS} = 10V

Electrical Characteristics (T_J = 25°C)

Static characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	2.0	2.8	4.0	V	V_{DS}=VGS, I_D=250 μA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=100 V, V_{GS}=0 V
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	V_{GS}=±20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	-	4.5	5.5	mΩ	V_{GS}=10 V, I_D=40 A
Gate resistance	R_G	-	2.5	-	Ω	f=1MHz
Transconductance	g_{fs}	-	80	-	S	V_{DS}=10 V, I_D=40 A

Dynamic characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C_{iss}	-	5,840	-	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance	C_{oss}	-	1,030	-	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	35	-	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	24	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=40 A, $R_{G,ext}$=3Ω
Rise time	t_r	-	12	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=40 A, $R_{G,ext}$=3Ω
Turn-off delay time	$t_{d(off)}$	-	65	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=40 A, $R_{G,ext}$=3Ω
Fall time	t_f	-	15	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=40 A, $R_{G,ext}$=3Ω

Gate charge characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	23	-	nC	V_{DD}=50 V, I_D=40 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{gs(th)}$	-	16	-	nC	V_{DD}=50 V, I_D=40 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	17	-	nC	V_{DD}=50 V, I_D=40 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	24	-	nC	V_{DD}=50 V, I_D=40 A, V_{GS}=0 to 10 V
Gate charge total	Q_g	-	85	-	nC	V_{DD}=50 V, I_D=40 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	4.3	-	V	V_{DD}=50 V, I_D=40 A, V_{GS}=0 to 10 V

Source-drain diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continous forward current	I_S	-	-	80	A	-
Diode pulse current	$I_{S,pulse}$	-	-	320	A	pulsed; tp ≤ 10 μs
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=40 A
Reverse recovery time	t_{rr}	-	80	-	ns	I_F=40 A, d_{iF}/dt=100 A/μs
Reverse recovery charge	Q_{rr}	-	240	-	nC	I_F=40 A, d_{iF}/dt=100 A/μs

Electrical characteristics diagrams

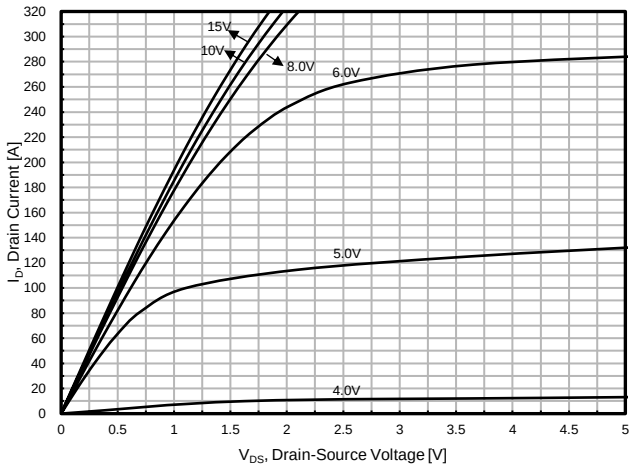


Fig. 1. On-Region Characteristics

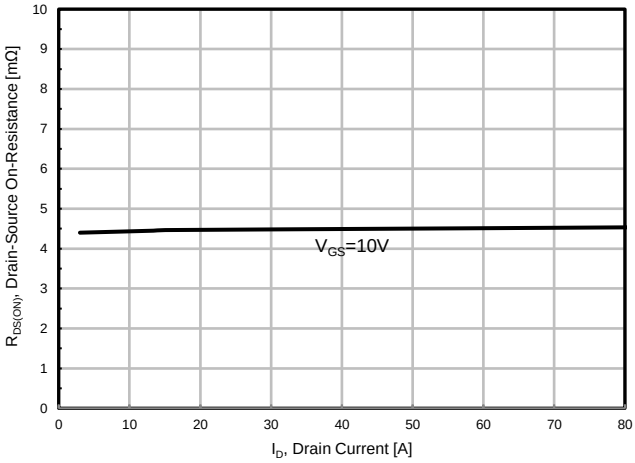


Fig. 2. On-Resistance vs. Drain Current and Gate Voltage

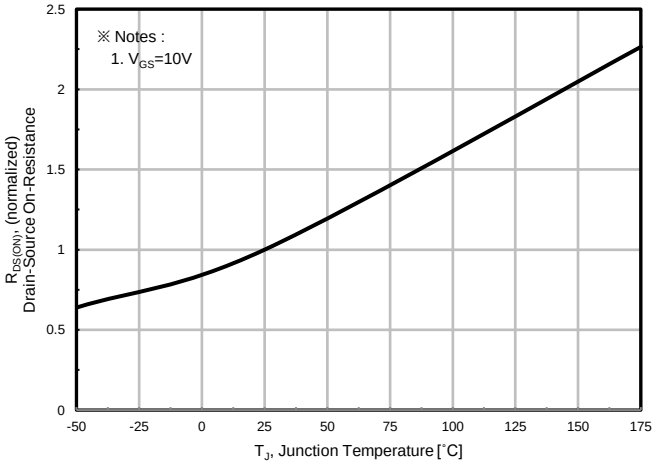


Fig. 3. On-Resistance vs. Junction Temperature

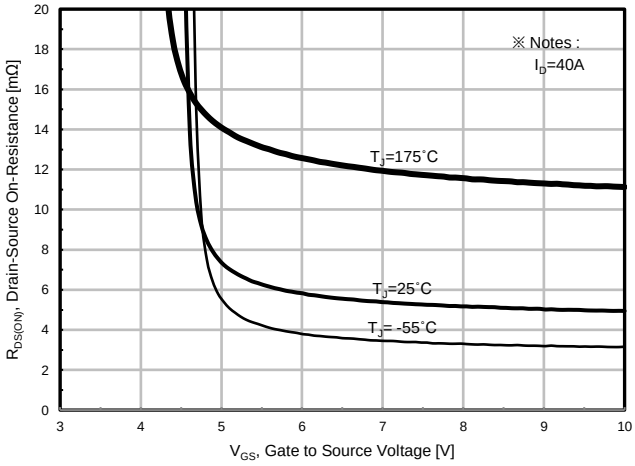


Fig. 4. On-Resistance vs. Gate to Source Voltage

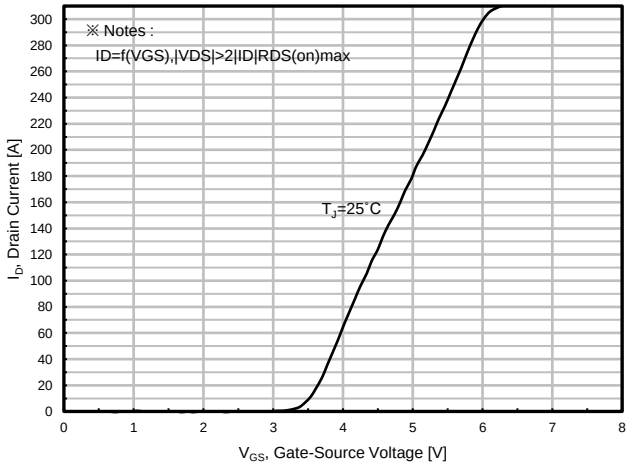


Fig. 5. Transfer Characteristics

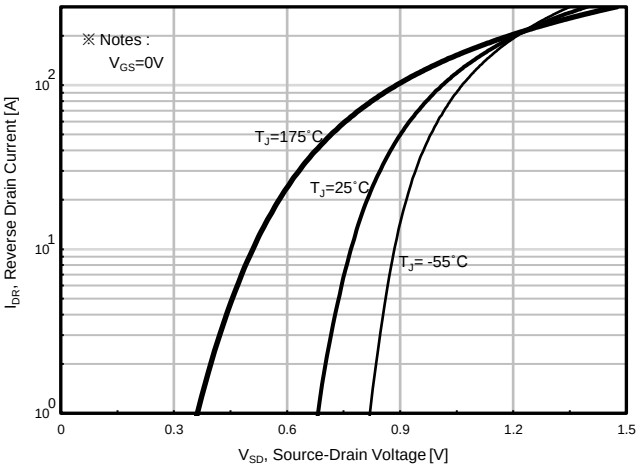


Fig. 6. Source-Drain Diode Forward Voltage

Electrical characteristics diagrams

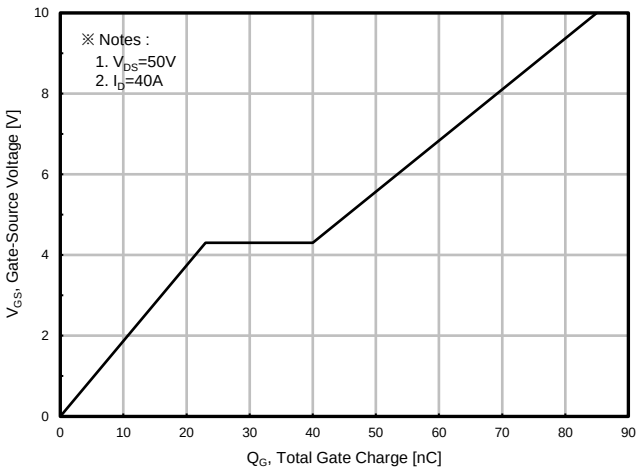


Fig. 7. Gate Charge

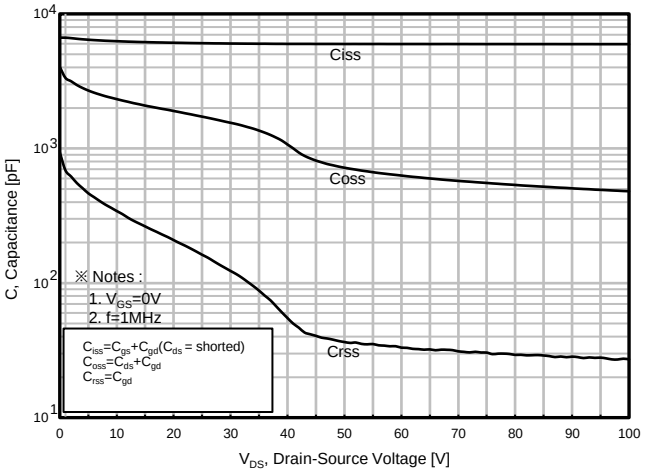


Fig. 8. Capacitance

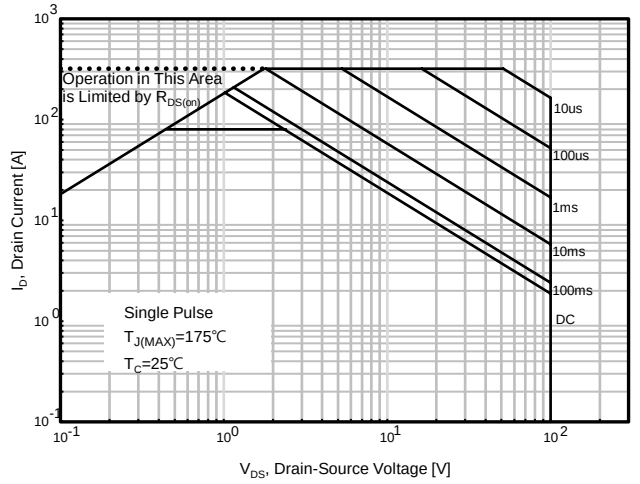


Fig. 9. Safe Operating Area, Junction-to-Ambient

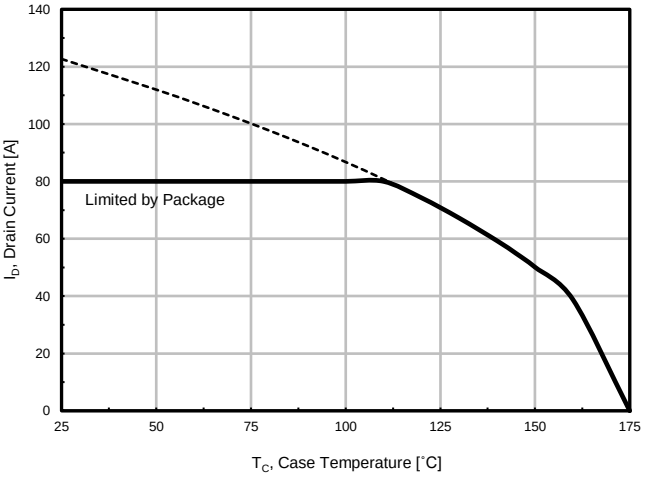


Fig. 10. Maximum Drain vs. Case Temperature

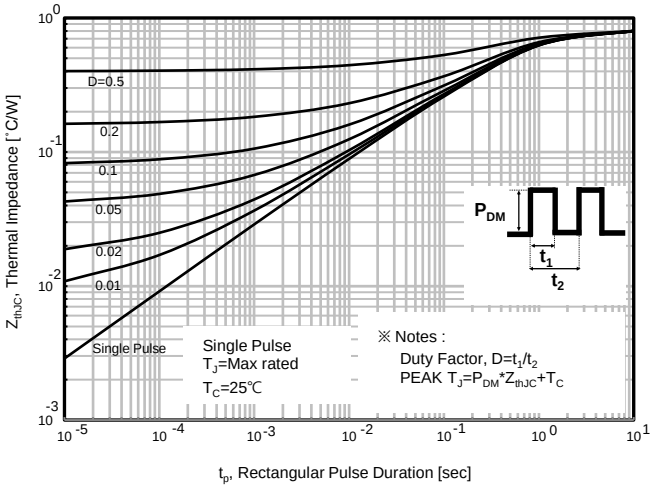
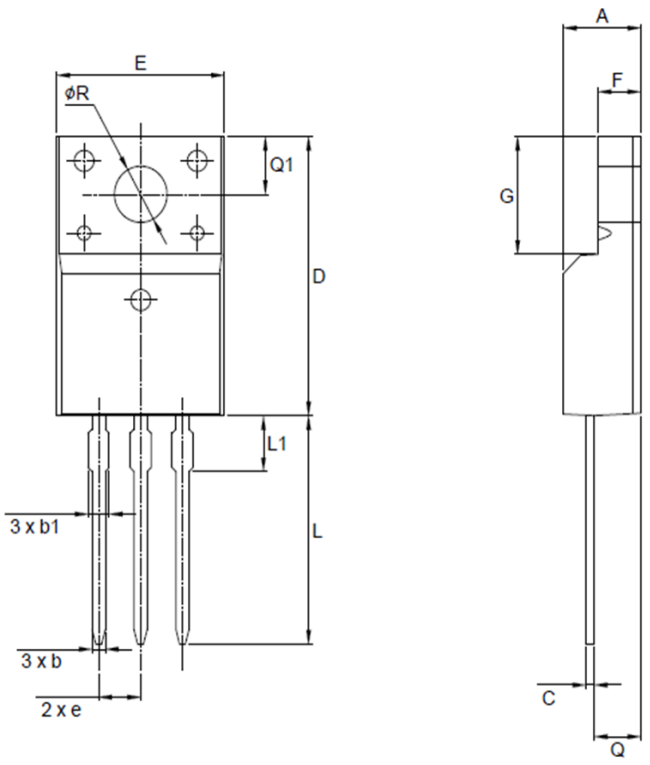


Fig. 11. Thermal Transient Impedance, Junction-to-Case

Package information

TO-220F



Symbol	Dimension (mm)		
	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

Notes

PKG dimension does not include mold burr and flash

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