MDU04N027RH

Single N-channel Trench MOSFET 40V 2.7mΩ 70A

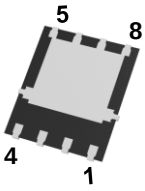
General description

The MDU04N027RH uses advanced Magnachip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance, and excellent quality.

This device can be utilized in appication such as BLDC motor inverter and Synchronous Rectification.

Top View

PDFN56



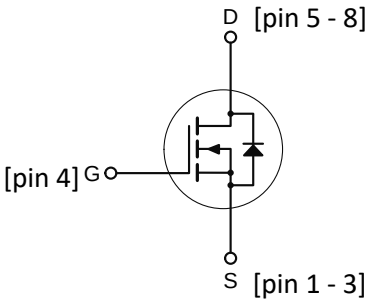
Bottom View

Features and benefits

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

Applications

- **BLDC Motor Inverter**
- **Synchronous Rectification**
- **Power Tool**



Key performance parameters

V_{DS}	**40**	V
$R_{DS(on),\ max}$	**0.0027**	Ω
I_D	**70**	A
Q_G	**78**	nC
Junction temperature, max	**150**	°C

RoHS Compliant
HALOGEN-FREE

Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDU04N027RH	PDFN56	04N027	Tape & Reel	Halogen Free

http://www.magnachip.com/powersolutions

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

Parameter		Symbol	Rating	Unit
Drain-source Voltage		V_{DS}	40	V
Gate-source Voltage		V_{GS}	± 20	V
[1] Drain current	Tc=25°C Silicon Limited	I_D	127	A
	Tc=25°C Package Limited		70	A
	Tc=100°C Silicon Limited		80	A
Pulsed drain current	Tc=25°C	I_{DM}	280	V
Total power dissipation	Tc=25°C	P_{tot}	74	W
	Tc=100°C		29	W
[3] Avalanche energy, single pulse		E_{AS}	162	mJ
Operating and storage temperature		T_j, T_{stg}	- 55 ~ 150	°C

Thermal characteristics

Parameter	Symbol	Rating	Unit
[1] Thermal resistance, junction - case	$R_{\theta JC}$	1.7	K/W
Thermal resistance, junction - ambient	$R_{\theta JA}$	50	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} = 18A, V_{DD} = 20V, V_{GS} = 10V

Electrical Characteristics (T_J = 25°C)

Static characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	$V_{(BR)DSS}$	40	-	-	V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	1.0	-	3.0	V	V_{DS}=VGS, I_D=250 μA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=32 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	$R_{DS(on)}$	-	2.2	2.7	mΩ	V_{GS}=10 V, I_D=27 A
Gate resistance	R_G	-	1.2	-	Ω	f=1MHz
Transconductance	g_{fs}	-	60	-	S	V_{DS}=10 V, I_D=27 A

Dynamic characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C_{iss}	-	4360	-	pF	V_{GS}=0 V, V_{DS}=20 V, f=1 MHz
Output capacitance	C_{oss}	-	1140	-	pF	V_{GS}=0 V, V_{DS}=20 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	110	-	pF	V_{GS}=0 V, V_{DS}=20 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	16	-	ns	V_{DD}=20 V, V_{GS}=10 V, ID=27 A, $R_{G,ext}$=3Ω
Rise time	t_r	-	14	-	ns	V_{DD}=20 V, V_{GS}=10 V, ID=27 A, $R_{G,ext}$=3Ω
Turn-off delay time	$t_{d(off)}$	-	67	-	ns	V_{DD}=20 V, V_{GS}=10 V, ID=27 A, $R_{G,ext}$=3Ω
Fall time	t_f	-	22	-	ns	V_{DD}=20 V, V_{GS}=10 V, ID=27 A, $R_{G,ext}$=3Ω

Gate charge characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	11	-	nC	V_{DD}=20 V, I_D=27 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{gs(th)}$	-	8	-	nC	V_{DD}=20 V, I_D=27 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	15	-	nC	V_{DD}=20 V, I_D=27 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	18	-	nC	V_{DD}=20 V, I_D=27 A, V_{GS}=0 to 10 V
Gate charge total	Q_g	-	78	-	nC	V_{DD}=20 V, I_D=27 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	2.9	-	V	V_{DD}=20 V, I_D=27 A, V_{GS}=0 to 10 V

Source-drain diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continous forward current	I_S	-	-	70	A	-
Diode pulse current	$I_{S,pulse}$	-	-	280	A	pulsed; tp ≤ 10 μs
Diode forward voltage	V_{SD}	-	1.0	1.2	V	V_{GS}=0 V, I_S=50 A
Reverse recovery time	t_{rr}	-	47.5	-	ns	I_F=27 A, d_{iF}/dt=100 A/μs
Reverse recovery charge	Q_{rr}	-	52	-	nC	I_F=27 A, d_{iF}/dt=100 A/μs

Electrical characteristics diagrams

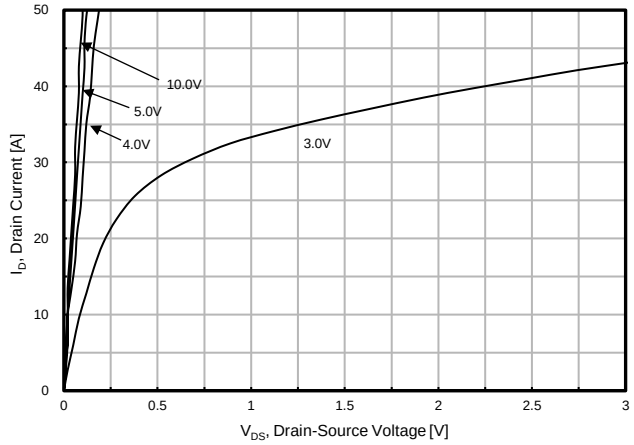


Fig. 1. On-Region Characteristics

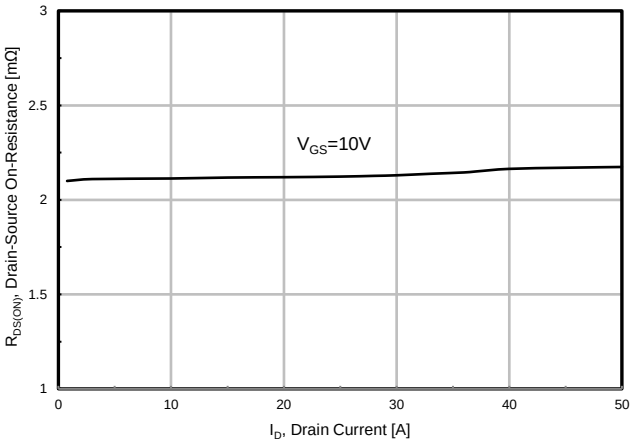


Fig. 2. On-Resistance vs. Drain Current and Gate Voltage

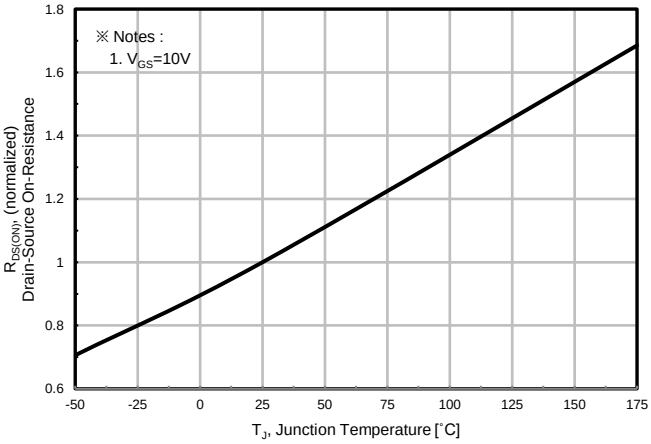


Fig. 3. On-Resistance vs. Junction Temperature

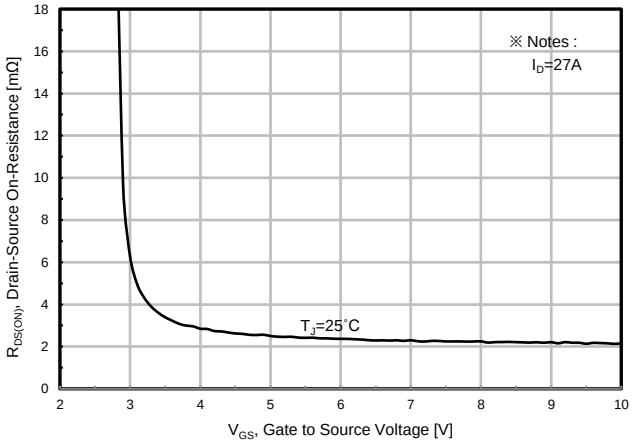


Fig. 4. On-Resistance vs. Gate to Source Voltage

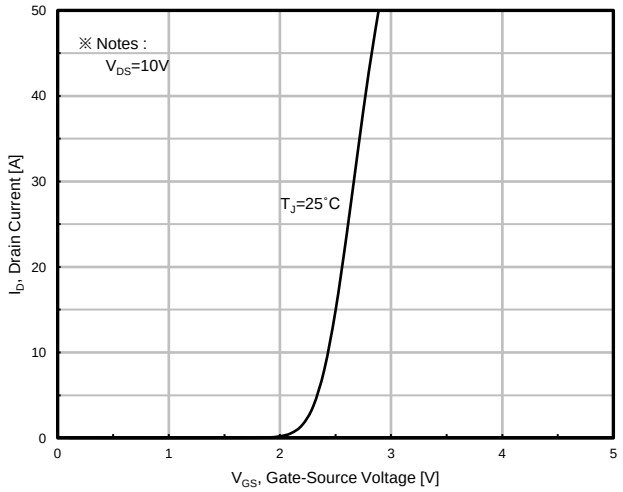


Fig. 5. Transfer Characteristics

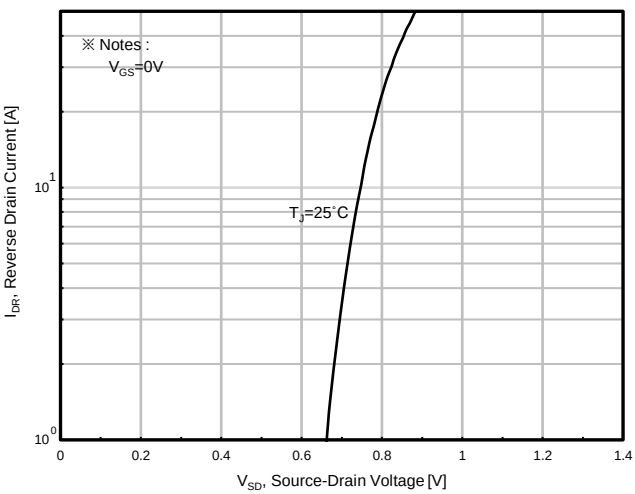


Fig. 6. Source-Drain Diode Forward Voltage

Electrical characteristics diagrams

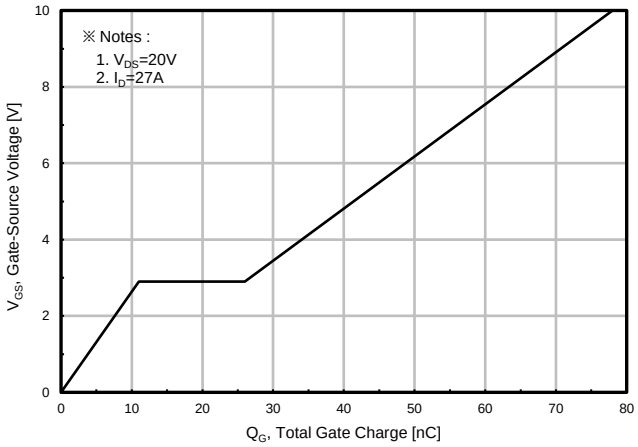


Fig. 7. Gate Charge

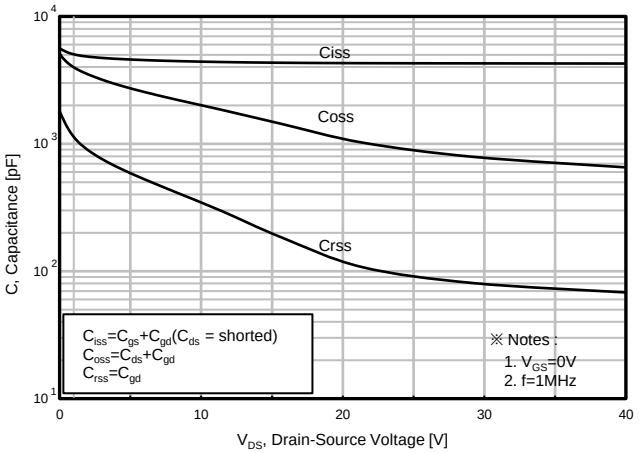


Fig. 8. Capacitance

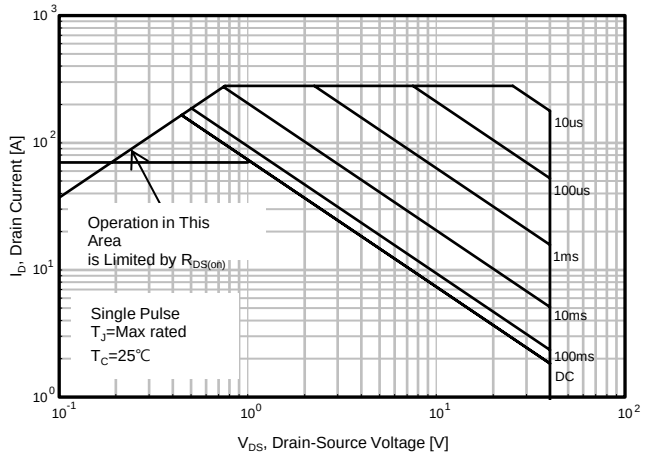


Fig. 9. Safe Operating Area, Junction-to-Ambient

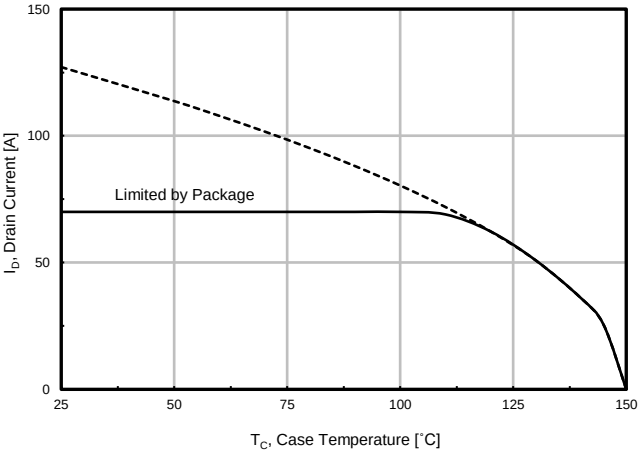


Fig. 10. Maximum Drain vs. Case Temperature

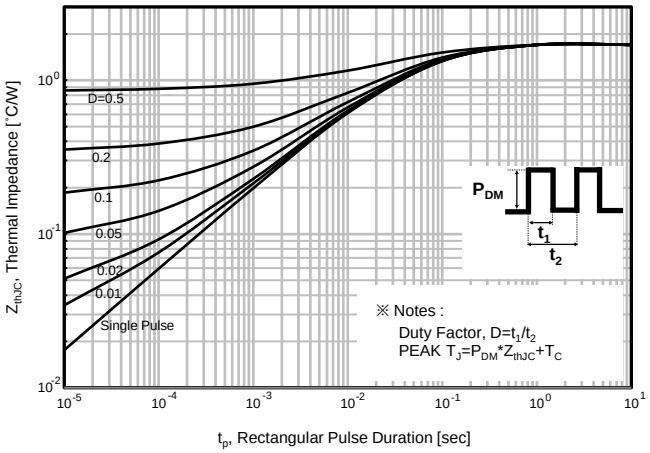
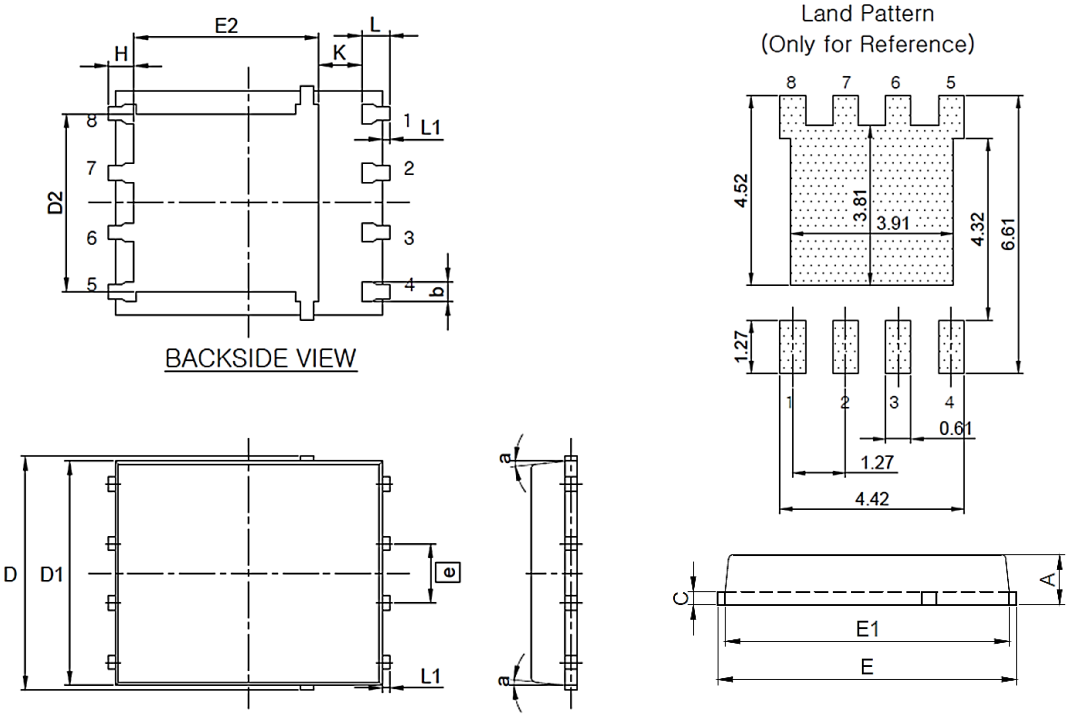


Fig. 11. Thermal Transient Impedance, Junction-to-Case

Package information

PDFN56



Symbol	Dimension (mm)		
	Min.	Norm.	Max.
A	0.90	-	1.10
B	0.33	-	0.51
C	0.20	-	0.34
D	4.50	-	5.30
D1	4.50	-	5.10
D2	3.61	-	4.22
E	5.90	-	6.30
E1	5.50	-	6.10
E2	3.38	-	4.30
e	1.27 BSC		
H	0.41	-	0.71
K	0.20	-	-
L	0.51	-	0.71
L1	0.06	-	0.20
a	0°	-	12°
* Note : Package body size, length and width do not include mold flash, protrusions and gate burs.			

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