



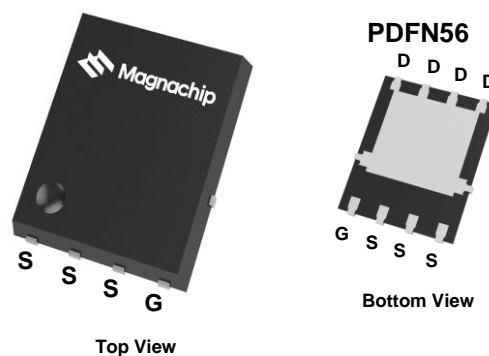
MDU04N070RH

Single N-channel Trench MOSFET 40V 7.0mΩ 77A

General description

The MDU04N070RH 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.

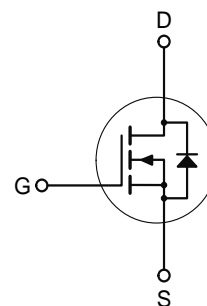


Features and benefits

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

Applications

- Switching Applications



Key performance parameters

V_{DS}	40	V
$R_{DS(on), max}$	0.007	Ω
I_D	77	A
Q_G	33.4	nC
Junction temperature, $_{max}$	150	$^{\circ}C$



Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDU04N070RH	PDFN56	04N070	Tape & Reel	Halogen Free

<http://www.magnachip.com/>

Maximum ratings, at $T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Rating	Unit	
Drain-source Voltage	V_{DS}	40	V	
Gate-source Voltage	V_{GS}	± 20	V	
Drain current	I_D	$T_C=25^\circ\text{C}$ Silicon Limited	77	A
		$T_C=100^\circ\text{C}$ Silicon Limited	48	A
¹⁾ Pulsed drain current	I_{DM}	308	A	
Total power dissipation	P_{tot}	$T_C=25^\circ\text{C}$	66	W
		$T_C=100^\circ\text{C}$	26	W
²⁾ Avalanche energy, single pulse	E_{AS}	61	mJ	
Operating and storage temperature	T_j, T_{stg}	- 55 ~ 150	$^\circ\text{C}$	

Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, junction - case	$R_{\theta JC}$	1.9	K/W
³⁾ Thermal resistance, junction - ambient	$R_{\theta JA}$	50	K/W

Notes

- Pulse width limited by T_{jmax}
- Starting $T_J=25^\circ\text{C}$, $L=1\text{mH}$, $I_{AS}=11\text{A}$, $V_{DD}=20\text{V}$, $V_{GS}=10\text{V}$
- Surface mounted FR-4 board by JEDEC (jesd51-7)

Electrical Characteristics ($T_J = 25^\circ\text{C}$)

Static characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	$V_{(BR)DSS}$	40	-	-	V	$V_{GS}=0\text{ V}$, $I_D=250\ \mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	1.5	1.9	3.0	V	$V_{DS}=V_{GS}$, $I_D=250\ \mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=32\text{ V}$, $V_{GS}=0\text{ V}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	6.1	7.0	m Ω	$V_{GS}=10\text{ V}$, $I_D=14\text{ A}$
		-	8.2	9.5	m Ω	$V_{GS}=4.5\text{ V}$, $I_D=11\text{ A}$
Gate resistance	R_G	-	2.1	-	Ω	$f=1\text{MHz}$

Dynamic characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C_{iss}	-	2,085	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=20\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	250	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=20\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	113	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=20\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	13	-	ns	$V_{DD}=20\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=14\text{ A}$, $R_{G,ext}=3\Omega$
Rise time	t_r	-	4	-	ns	$V_{DD}=20\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=14\text{ A}$, $R_{G,ext}=3\Omega$
Turn-off delay time	$t_{d(off)}$	-	42	-	ns	$V_{DD}=20\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=14\text{ A}$, $R_{G,ext}=3\Omega$
Fall time	t_f	-	7	-	ns	$V_{DD}=20\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=14\text{ A}$, $R_{G,ext}=3\Omega$

Gate charge characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	5.8	-	nC	$V_{DD}=20\text{ V}$, $I_D=14\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{gs(th)}$	-	3.8	-	nC	$V_{DD}=20\text{ V}$, $I_D=14\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}	-	5.6	-	nC	$V_{DD}=20\text{ V}$, $I_D=14\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	7.9	-	nC	$V_{DD}=20\text{ V}$, $I_D=14\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total	Q_g	-	33.4	-	nC	$V_{DD}=20\text{ V}$, $I_D=14\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	3.2	-	V	$V_{DD}=20\text{ V}$, $I_D=14\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$

Source-drain diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continuous forward current	I_S	-	-	77	A	-
Diode pulse current	$I_{S,pulse}$	-	-	308	A	pulsed; $t_p \leq 10\ \mu\text{s}$
Diode forward voltage	V_{SD}	-	0.8	1.2	V	$V_{GS}=0\text{ V}$, $I_F=14\text{ A}$
Reverse recovery time	t_{rr}	-	47	-	ns	$I_F=14\text{ A}$, $d_{IF}/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	44	-	nC	$I_F=14\text{ A}$, $d_{IF}/dt=100\text{ A}/\mu\text{s}$

Electrical characteristics diagrams

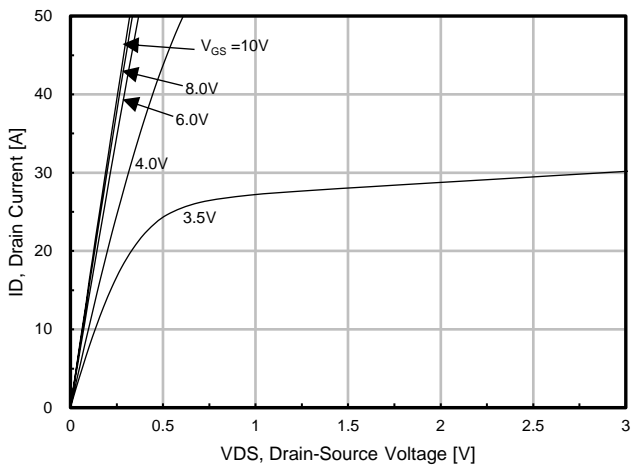


Fig. 1. Output Characteristics

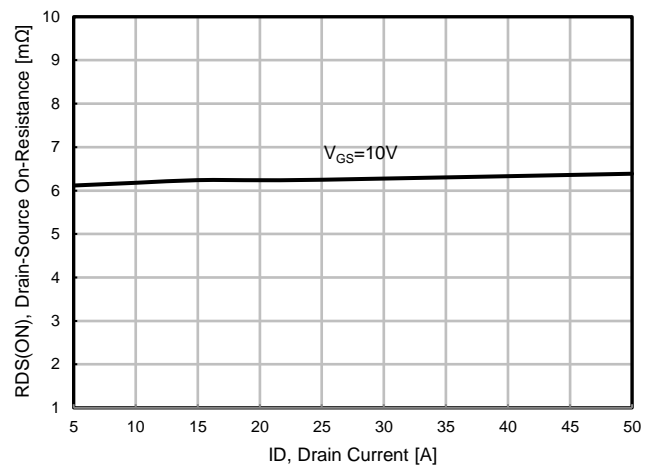


Fig. 2. Static On-Resistance Variation

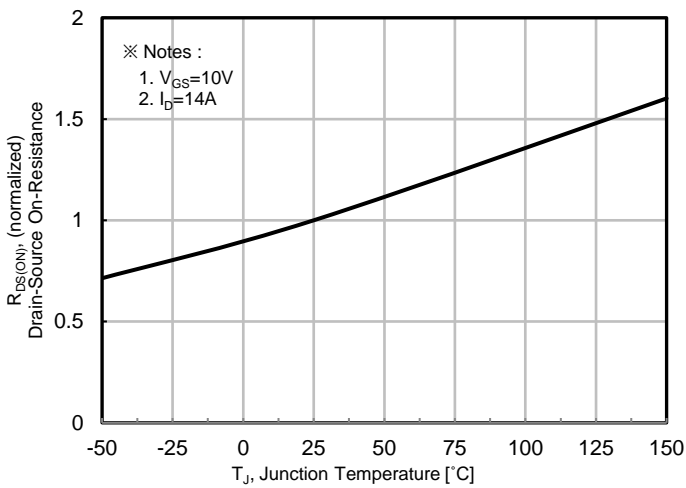


Fig. 3. On-Resistance vs. Junction Temperature

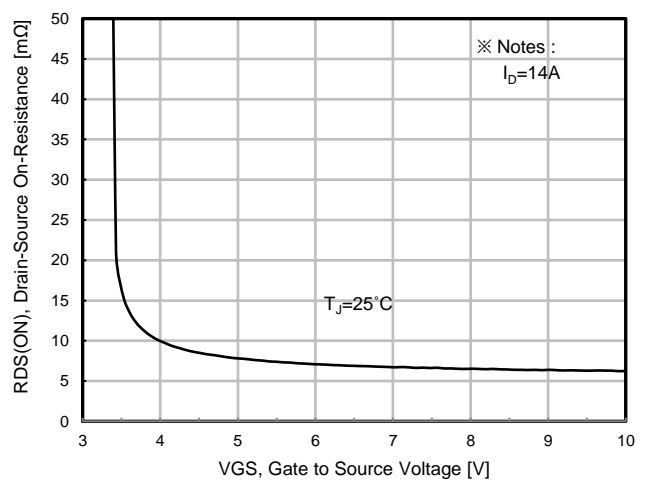


Fig. 4. On-Resistance vs. Gate to source Voltage

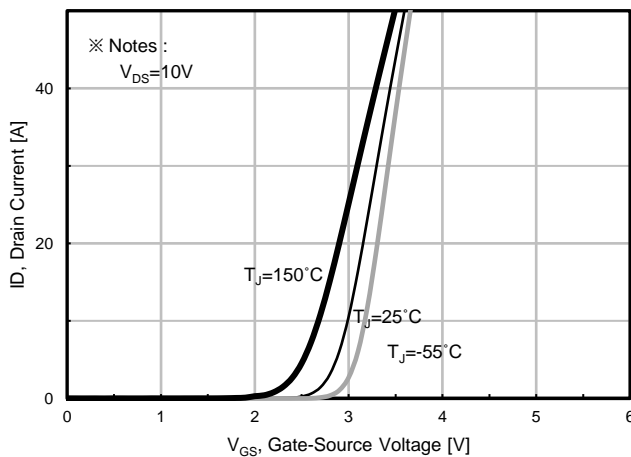


Fig. 5. Transfer Characteristics

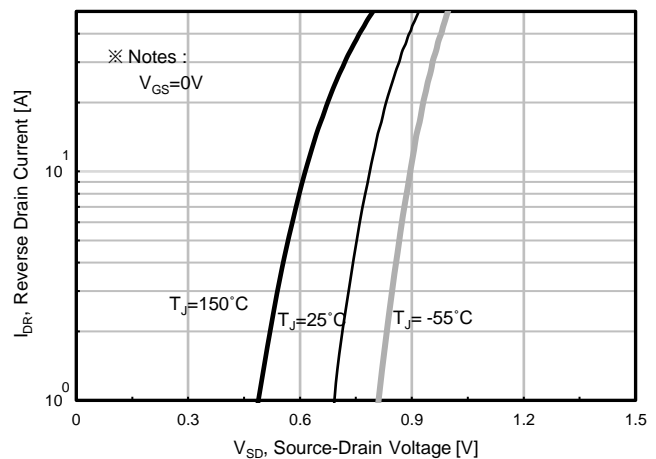


Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Electrical characteristics diagrams

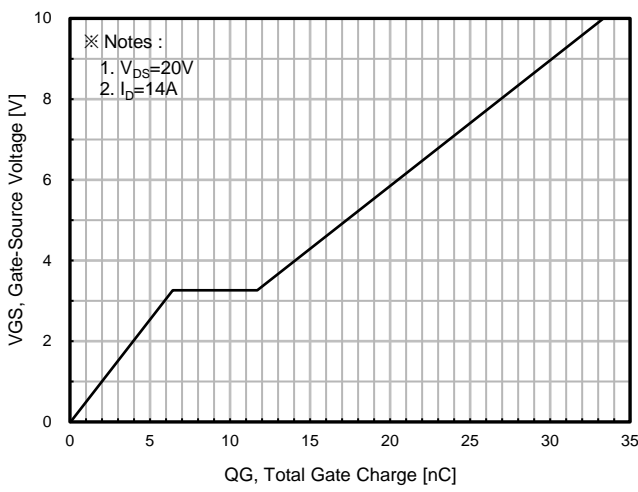


Fig. 7. Gate Charge

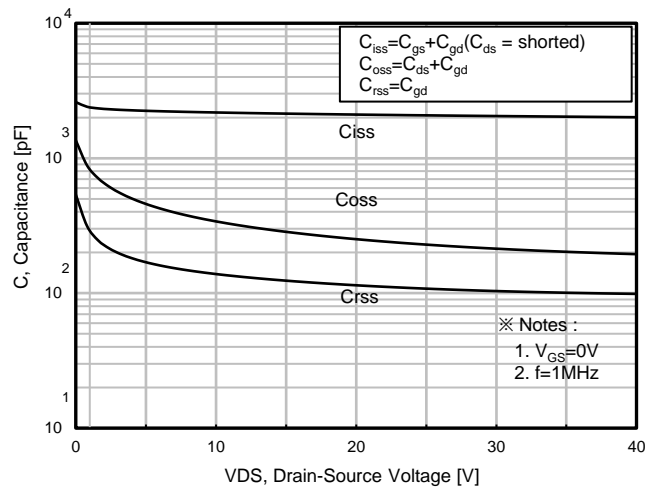


Fig. 8. Capacitance

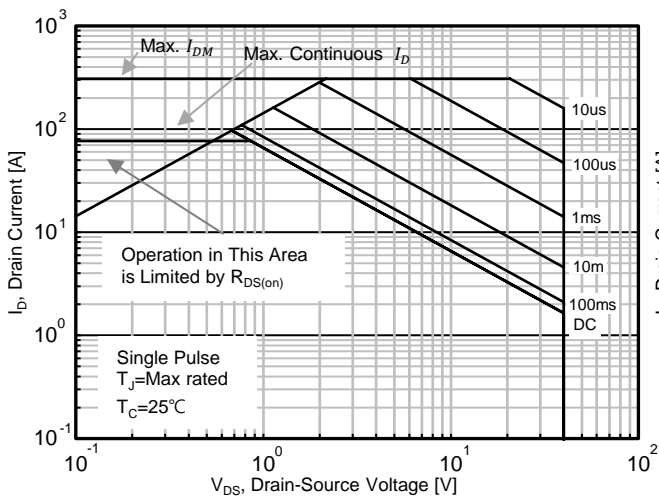


Fig. 9. Safe Operating Area, Junction-to-Ambient

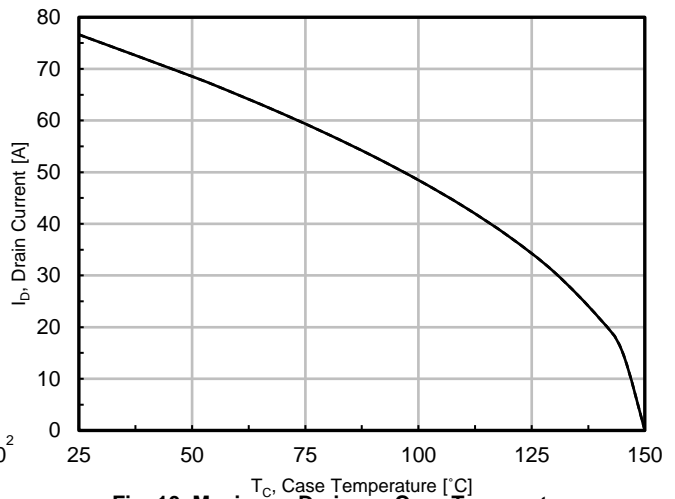


Fig. 10. Maximum Drain vs. Case Temperature

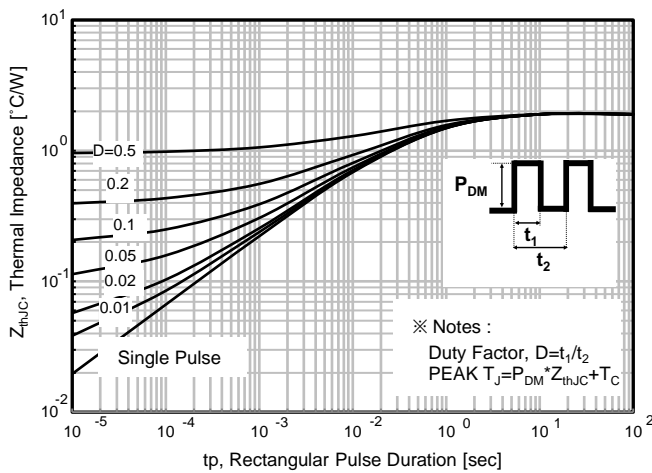
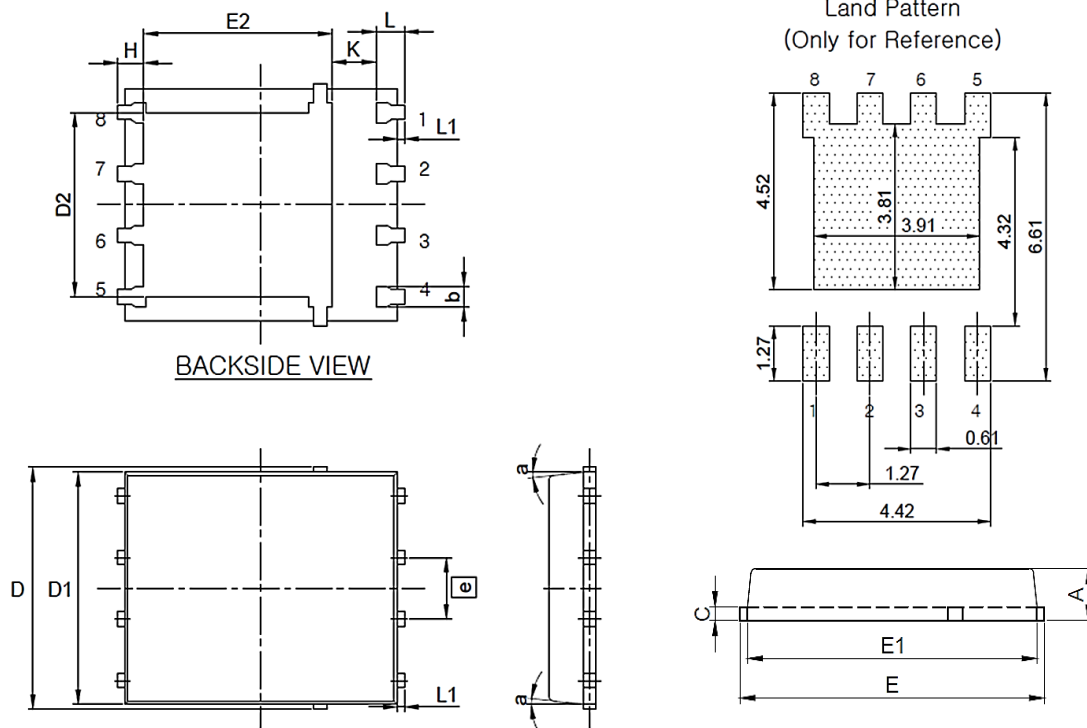


Fig. 11. Transient Thermal Impedance

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°

Notes

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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