



AMDU040N014VRH

Single N-channel Trench MOSFET 40V 1.4mΩ 194A

FEATURES

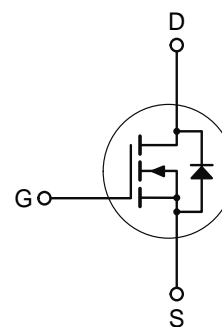
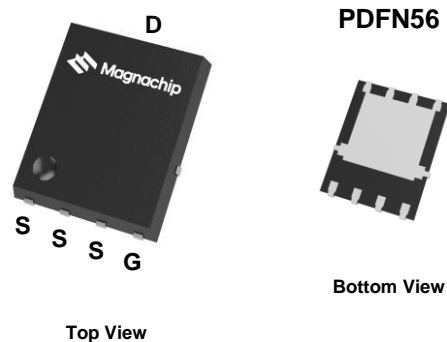
- Trench power MOSFET technology
- N-channel, normal level
- Enhanced avalanche ruggedness
- 100% Avalanche tested
- Maximum 175°C junction temperature
- AEC-Q101 qualified

APPLICATIONS

- DC/DC and AC/DC converters
- Brushed and BLDC motor drive systems

KEY PERFORMANCE PARAMETERS

V_{DS}	40	V
$R_{DS(on), typ.}$	0.0011	Ω
I_D	194	A
Q_G	71	nC
Junction temperature _{, max}	175	°C



ORDERING INFORMATION

Type / Ordering Code	Package	Marking	Packing	RoHS Status
AMDU040N014VRH	PDFN56	040N014	Tape & Reel	Halogen Free

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

ABSOLUTE MAXIMUM RATINGS, at $T_C = 25^\circ\text{C}$, unless otherwise specified

PARAMETER		SYMBOL	RATING	UNIT
Drain-source Voltage		V_{DS}	40	V
Gate-source Voltage		V_{GS}	± 20	V
Drain current	$T_C=25^\circ\text{C}$	I_D	194	A
	$T_C=100^\circ\text{C}$		137	A
¹⁾ Pulsed drain current	$T_C=25^\circ\text{C}$	I_{DM}	776	A
Total power dissipation	$T_C=25^\circ\text{C}$	P_{tot}	100	W
	$T_C=100^\circ\text{C}$		50	W
²⁾ Avalanche energy, single pulse		E_{AS}	288	mJ
Operating and storage temperature		T_j, T_{stg}	- 55 ~ 175	$^\circ\text{C}$

THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATING	UNIT
Thermal resistance, junction - case		$R_{\theta JC}$	1.5	K/W
³⁾ Thermal resistance, junction - ambient		$R_{\theta JA}$	50	K/W

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)}	2.35	3.10	3.85	V	V _{DS} =V _{GS} , I _D =250 μA
Zero gate voltage drain current	I _{DSS}	-	-	1	μA	V _{DS} =40 V, V _{GS} =0 V, T _j =25°C
Gate-source leakage current	I _{GSS}	-	-	± 100	nA	V _{GS} =±20 V, V _{DS} =0 V
Drain-source on-state resistance	R _{DS(on)}	-	1.1	1.4	mΩ	V _{GS} =10 V, I _D =50 A
		-	1.2	1.7	mΩ	V _{GS} =8V, I _D =50 A
⁴⁾ Gate resistance	R _G	-	3.5	-	Ω	f=1MHz
⁴⁾ Transconductance	g _{fs}	-	130	-	S	V _{DS} =10 V, I _D =50 A

⁴⁾ DYNAMIC CHARACTERISTICS

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C _{iss}	-	5,613	-	pF	V _{GS} =0 V, V _{DS} =20 V, f=1 MHz
Output capacitance	C _{oss}	-	1,594	-	pF	V _{GS} =0 V, V _{DS} =20 V, f=1 MHz
Reverse transfer capacitance	C _{rss}	-	105	-	pF	V _{GS} =0 V, V _{DS} =20 V, f=1 MHz
Turn-on delay time	t _{d(on)}	-	27	-	ns	V _{DD} =20 V, V _{GS} =10 V, I _D =50 A, R _{G,ext} =3Ω
Rise time	t _r	-	13	-	ns	V _{DD} =20 V, V _{GS} =10 V, I _D =50 A, R _{G,ext} =3Ω
Turn-off delay time	t _{d(off)}	-	66	-	ns	V _{DD} =20 V, V _{GS} =10 V, I _D =50 A, R _{G,ext} =3Ω
Fall time	t _f	-	26	-	ns	V _{DD} =20 V, V _{GS} =10 V, I _D =50 A, R _{G,ext} =3Ω

⁴⁾ GATE CHARGE CHARACTERISTICS

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q _{gs}	-	26	-	nC	V _{DD} =20 V, I _D =50 A, V _{GS} =0 to 10 V
Gate charge at threshold	Q _{gs(th)}	-	16	-	nC	V _{DD} =20 V, I _D =50 A, V _{GS} =0 to 10 V
Gate to drain charge	Q _{gd}	-	11	-	nC	V _{DD} =20 V, I _D =50 A, V _{GS} =0 to 10 V
Switching charge	Q _{sw}	-	22	-	nC	V _{DD} =20 V, I _D =50 A, V _{GS} =0 to 10 V
Gate charge total	Q _g	-	71	-	nC	V _{DD} =20 V, I _D =50 A, V _{GS} =0 to 10 V
Gate plateau voltage	V _{plateau}	-	5.3	-	V	V _{DD} =20 V, I _D =50 A, V _{GS} =0 to 10 V

SOURCE-DRAIN DIODE

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
⁴⁾ Diode continuous forward current	I _S	-	-	194	A	-
⁴⁾ Diode pulse current	I _{S,pulse}	-	-	776	A	pulsed; tp ≤ 10 μs
Diode forward voltage	V _{SD}	-	0.86	1.2	V	V _{GS} =0 V, I _F =50 A
⁴⁾ Reverse recovery time	t _{rr}	-	106	-	ns	I _F =50 A, d _{I_F}/dt=100 A/μs}
⁴⁾ Reverse recovery charge	Q _{rr}	-	224	-	nC	I _F =50 A, d _{I_F}/dt=100 A/μs}

Notes

- Pulse width limited by T_{jmax}
- Starting T_J=25°C, L=1mH, I_{AS}=24A, V_{DD}=36V, V_{GS}=10V
- Surface mounted FR-4 board by JEDEC (jesd51-7)
- The parameter is not subject to production testing - guaranteed by design.

Electrical Characteristics Diagrams (25 °C, unless otherwise noted)

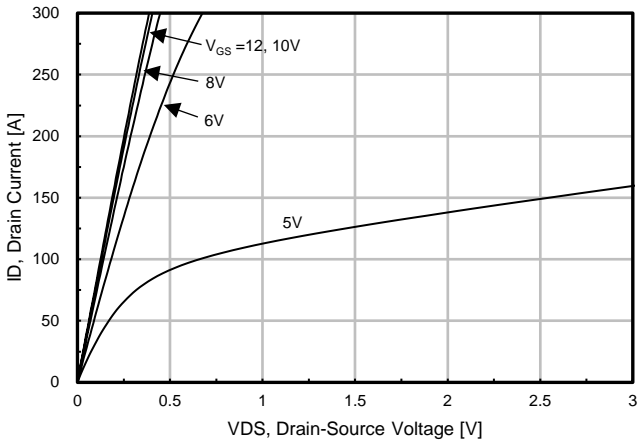


Fig. 1. Output Characteristics

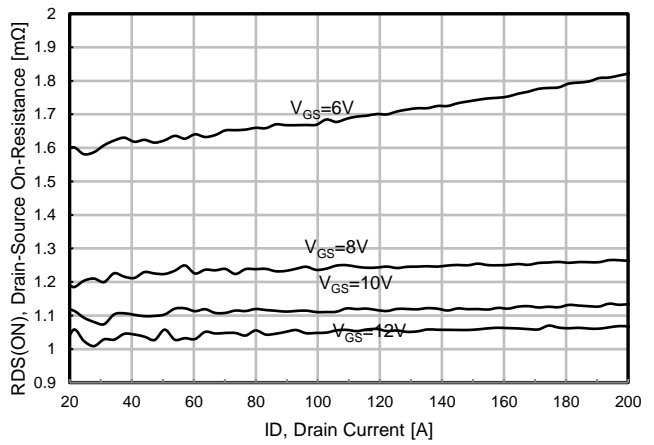


Fig. 2. Static On-Resistance Variation

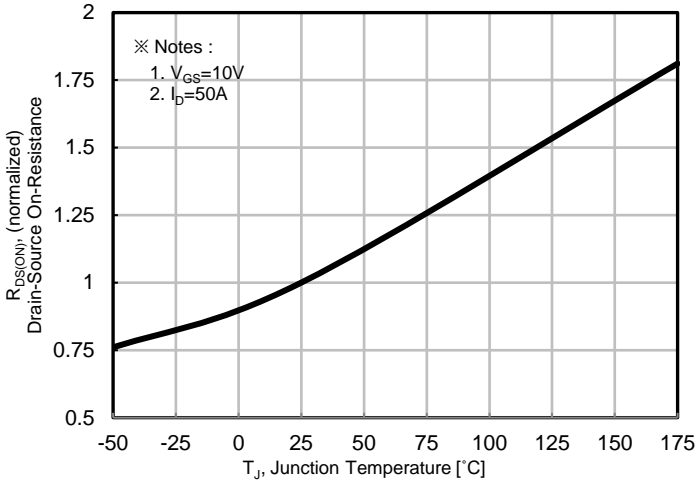


Fig. 3. On-Resistance vs. Junction Temperature

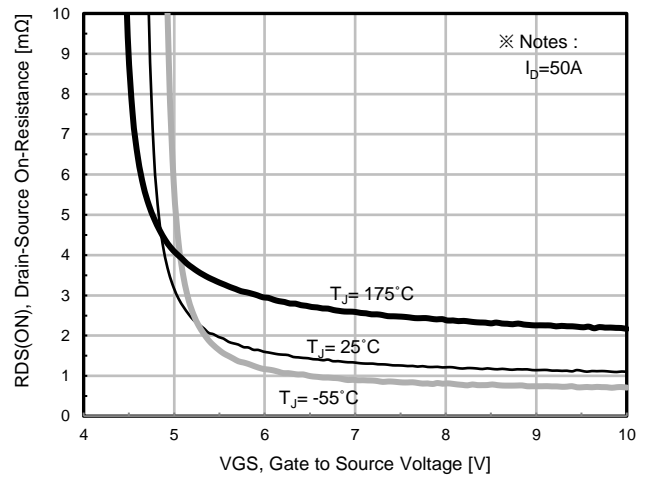


Fig. 4. On-Resistance vs. Gate to source Voltage

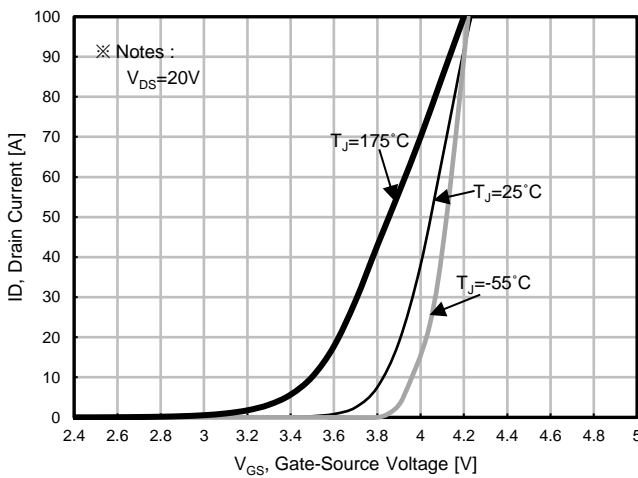


Fig. 5. Transfer Characteristics

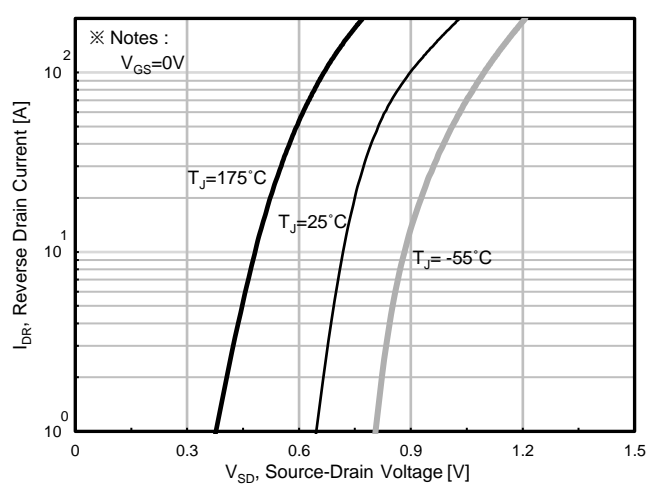


Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Electrical Characteristics Diagrams (25 °C, unless otherwise noted)

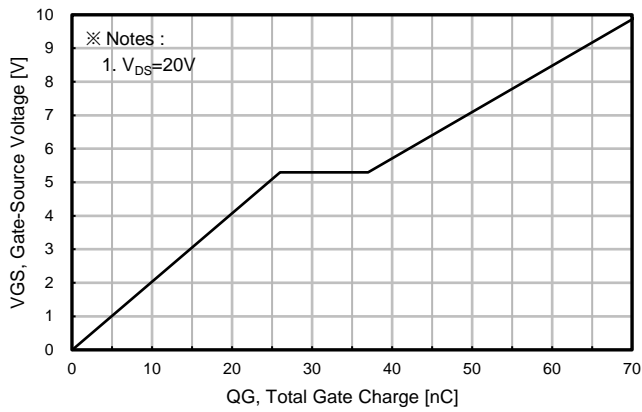


Fig. 7. Gate Charge

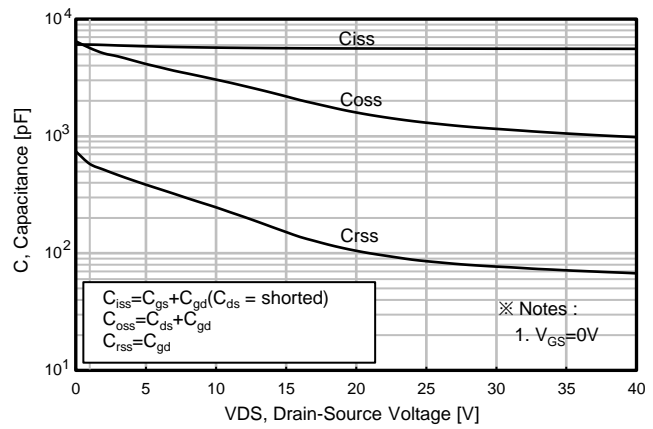


Fig. 8. Capacitance

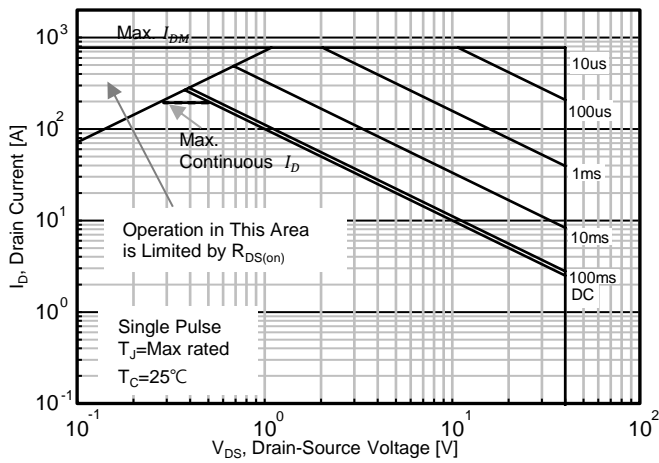


Fig. 9. Safe Operating Area, Junction-to-Ambient

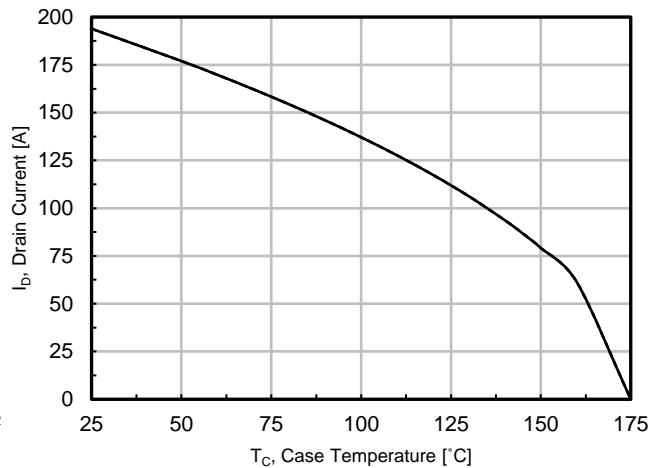


Fig. 10. Maximum Drain vs. Case Temperature

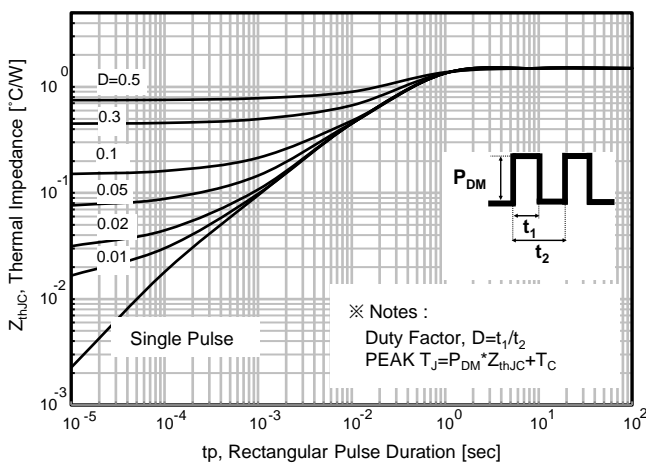
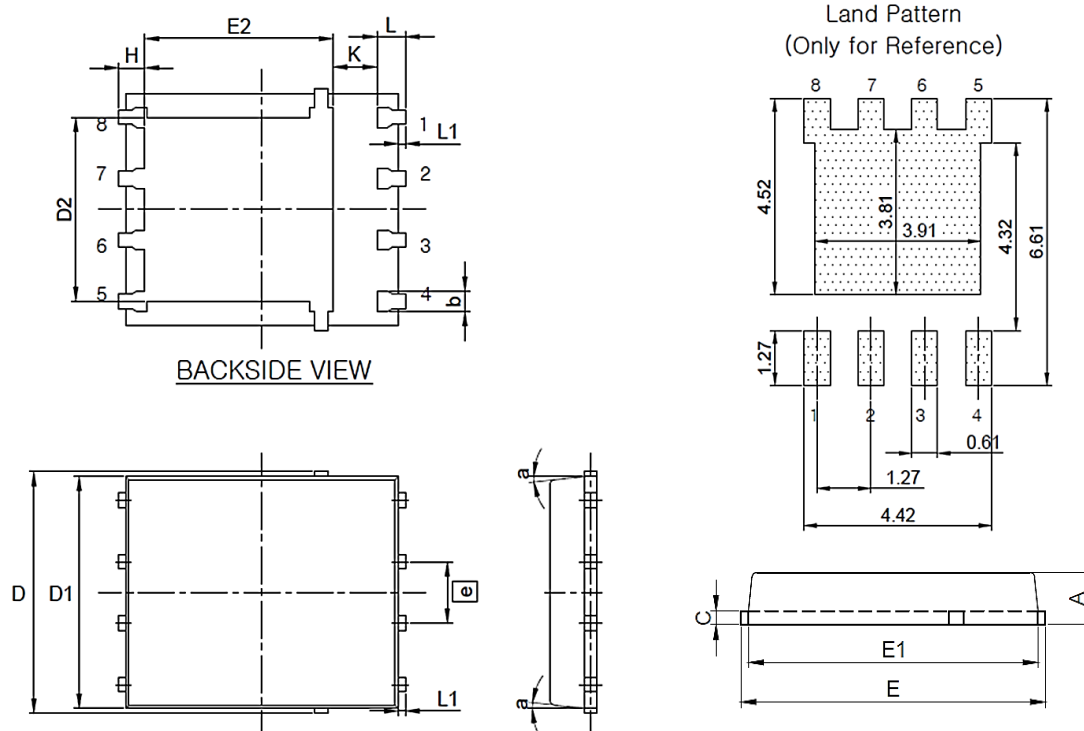


Fig. 11. Transient Thermal Impedance

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.

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