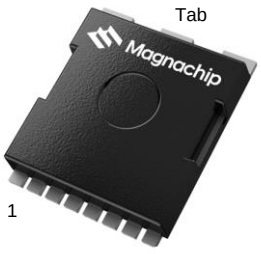
MDT10N023RH

Single N-channel Trench MOSFET 100V 2.3mΩ 300A

General description

The MDT10N023RH 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 high power drives of E-Vehicles(E-bike), DC/DC converter and BMS, general purpose applications.



Top View

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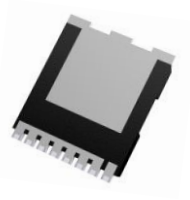


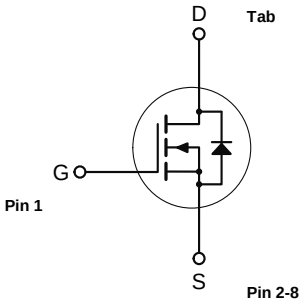
Bottom View

Features and benefits

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

Applications

- **Motor Inverter**
- **Battery Management**
- **Power Inverter**



Key performance parameters

V_{DS}	**100**	V
$R_{DS(on),\ max}$	**0.0023**	Ω
I_D	**300**	A
Q_G	**167**	nC
Junction temperature, max	**175**	°C

RoHS Compliant
Halogen-Free

Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDT10N023RH	TOLL	MDT10N023	Tape & Reel	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
Drain current	Tc=25°C Silicon Limited	I_D	302	A
	Tc=25°C Package Limited		300	A
	Tc=100°C Silicon Limited		214	A
[1] Pulsed drain current	Tc=25°C	I_{DM}	1200	A
Total power dissipation	Tc=25°C	P_{tot}	441	W
	Tc=100°C		221	W
[2] Avalanche energy, single pulse		E_{AS}	481	mJ
Operating and storage temperature		T_j, T_{stg}	- 55 ~ 175	°C

Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, junction - case	$R_{\theta JC}$	0.34	K/W
[3] Thermal resistance, junction - ambient	$R_{\theta JA}$	40	K/W

Notes

1. Pulse width limited by Tjmax
2. EAS is tested at starting Tj = 25℃, L = 1.0mH, I_{AS} = 31A, V_{DD} = 50V, V_{GS} = 10V
3. Surface mounted FR-4 board by JEDEC (jesd51-7)

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}=V_{GS}, 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	$R_{DS(on)}$	-	1.85	2.3	mΩ	V_{GS}=10 V, I_D=100 A
Gate resistance	R_G	-	3.0	-	Ω	f=1MHz
Transconductance	g_{fs}	-	130	-	S	V_{DS}=10 V, I_D=100 A

Dynamic characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C_{iss}	-	12,536	-	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance	C_{oss}	-	1,367	-	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	36	-	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	33	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω
Rise time	t_r	-	20	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω
Turn-off delay time	$t_{d(off)}$	-	108	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω
Fall time	t_f	-	40	-	ns	V_{DD}=50 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω

Gate charge characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	49	-	nC	V_{DD}=50 V, I_D=100 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{gs(th)}$	-	32	-	nC	V_{DD}=50 V, I_D=100 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	33	-	nC	V_{DD}=50 V, I_D=100 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	50	-	nC	V_{DD}=50 V, I_D=100 A, V_{GS}=0 to 10 V
Gate charge total	Q_g	-	167	-	nC	V_{DD}=50 V, I_D=100 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	4.6	-	V	V_{DD}=50 V, I_D=100 A, V_{GS}=0 to 10 V

Source-drain diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continous forward current	I_S	-	-	300	A	-
Diode pulse current	$I_{S,pulse}$	-	-	1200	A	pulsed; tp ≤ 10 μs
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=100 A
Reverse recovery time	t_{rr}	-	128	-	ns	I_F=100 A, d_{iF}/dt=100 A/μs
Reverse recovery charge	Q_{rr}	-	422	-	nC	I_F=100 A, d_{iF}/dt=100 A/μs

Electrical characteristics diagrams

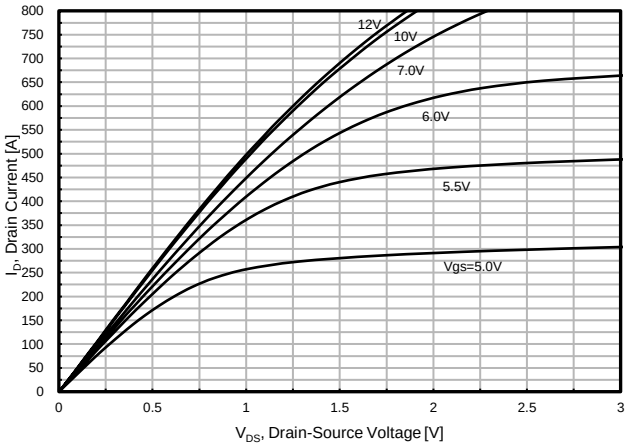


Fig. 1. Output Characteristics

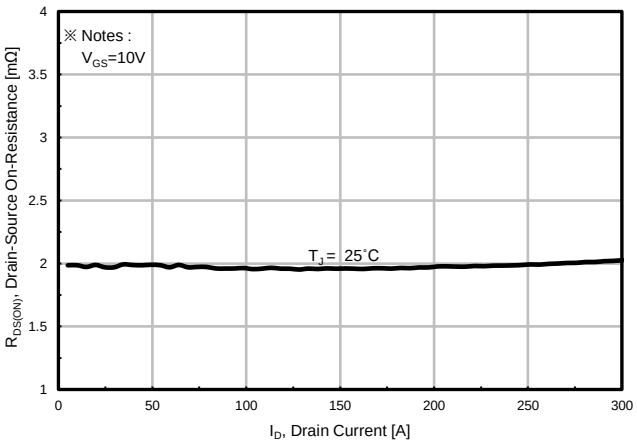


Fig. 2. Static On-Resistance Variation

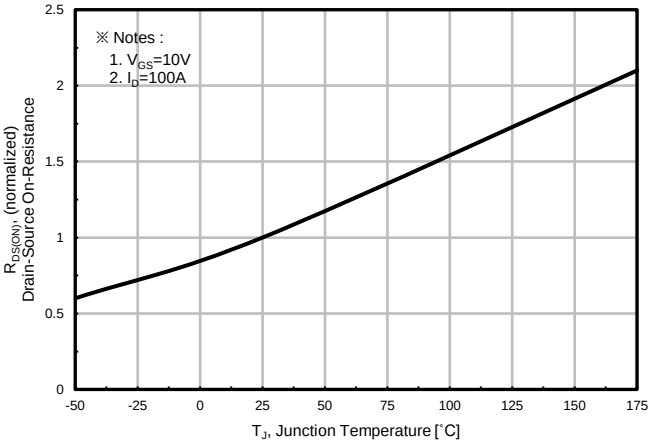


Fig. 3. On-Resistance vs. Junction Temperature

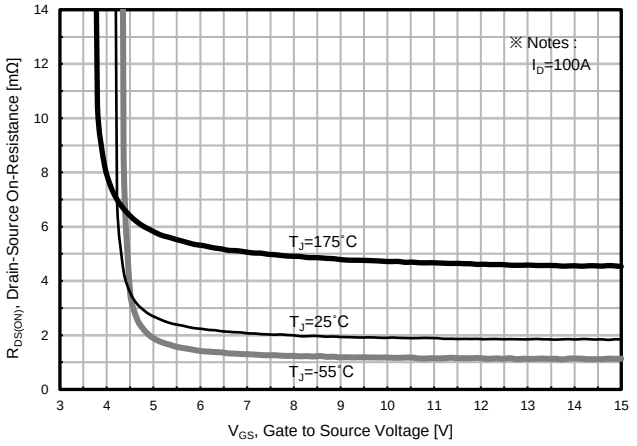


Fig. 4. On-Resistance vs. Gate to Source Voltage

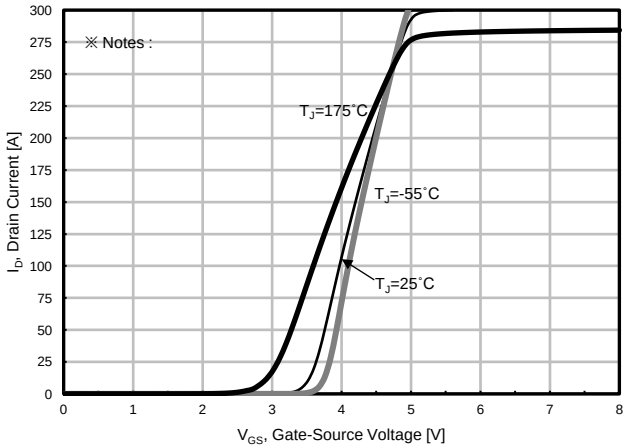


Fig. 5. Transfer Characteristics

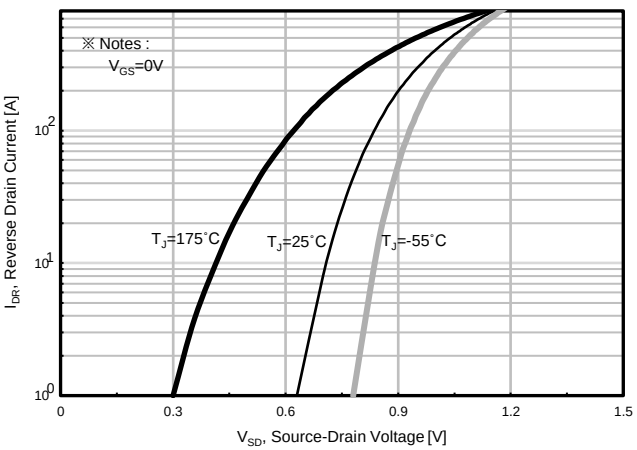
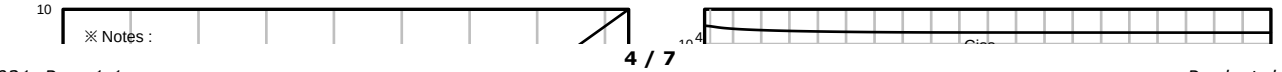


Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature



Electrical characteristics diagrams

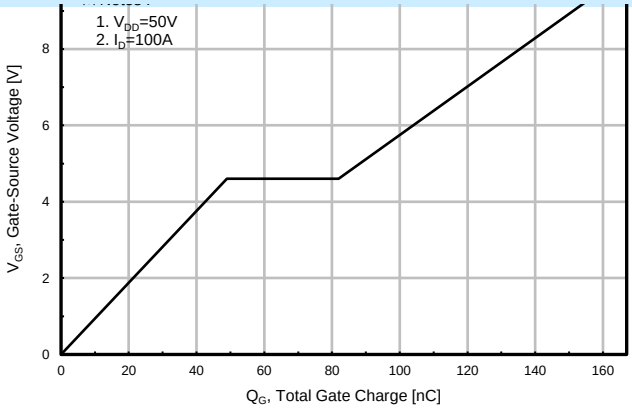


Fig. 7. Gate Charge

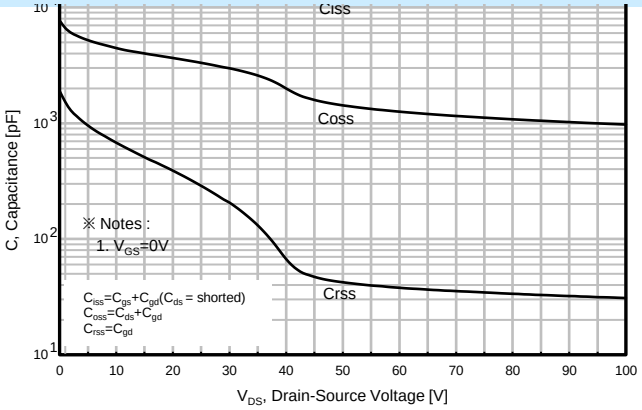


Fig. 8. Capacitances

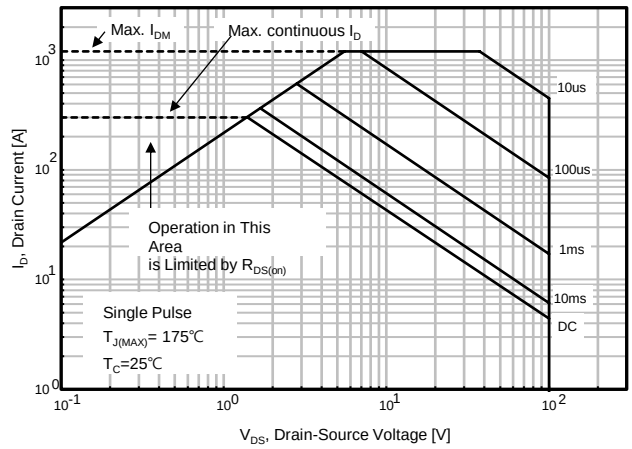


Fig. 9. Safe Operating Area

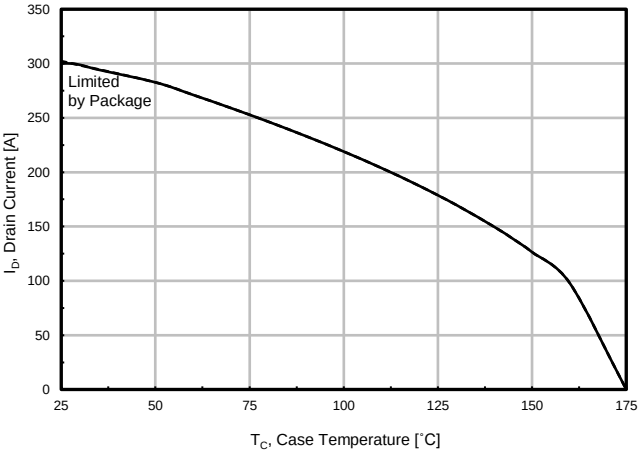


Fig. 10. Maximum Drain Current vs. Case Temperature

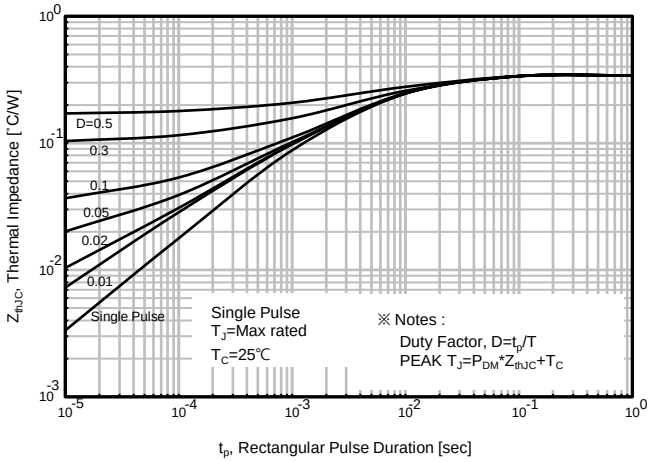


Fig. 11. Transient Thermal Impedance

Package information

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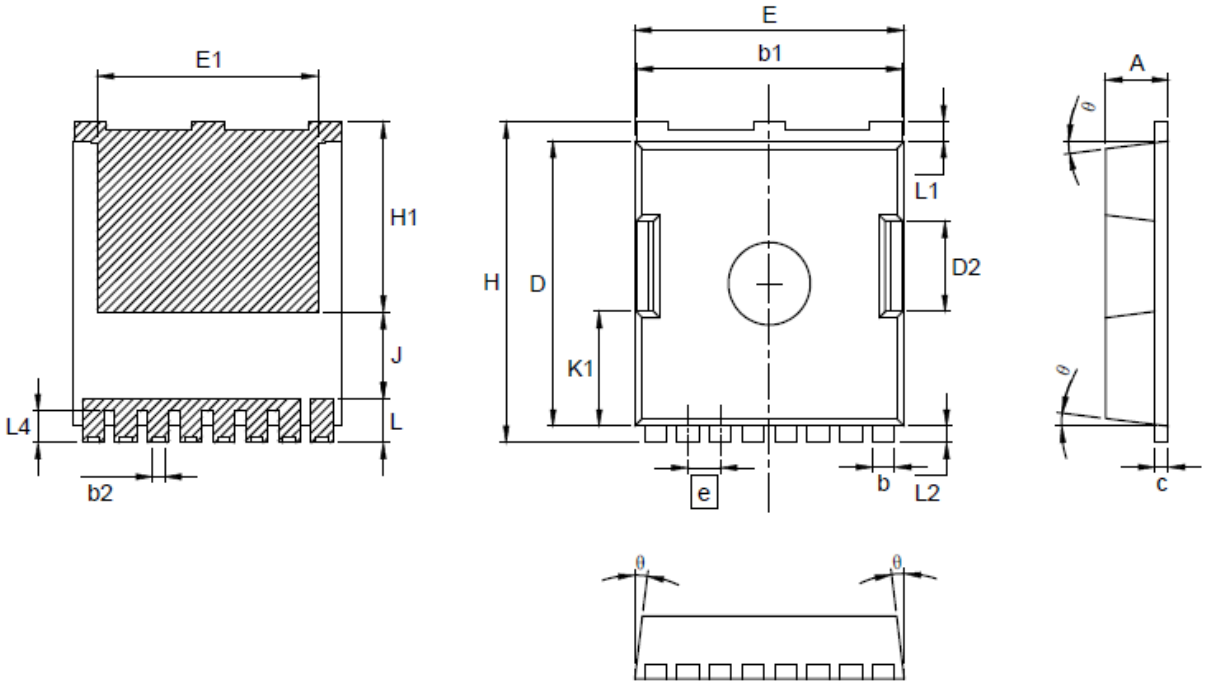

Symbol	Dimension (mm)		
	Min	Nom	Max
A	2.20	–	2.40
b	0.70	–	0.90
b1	9.70	–	9.90
b2	0.37	–	0.50
c	0.40	–	0.60
D	10.28	–	10.58
D2	3.10	_	3.65
E	9.70	9.90	10.10
E1	7.70	8.00	8.30
e	BSC 1.20		
H	11.48	11.68	11.90
H1	6.75	_	7.15
J	2.80	_	3.30
K1	3.98	4.18	4.38
L	1.38	1.60	1.98
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L4	1.00	1.15	1.30
Θ	4°	7°	10°

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.