



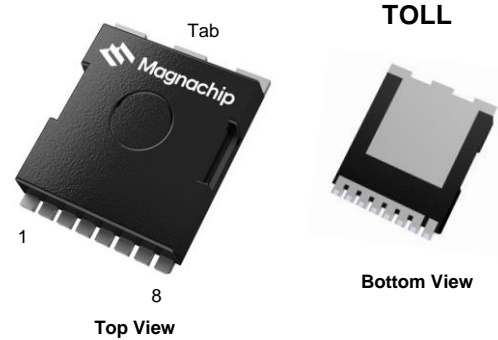
MDT10N023RH

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.

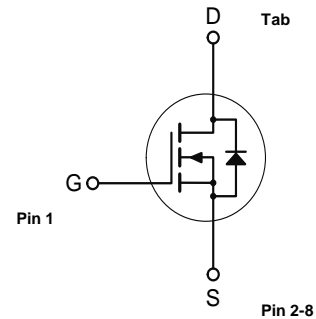


Features and benefits

- 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	$^{\circ}C$



Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDT10N023RH	TOLL	MDT10N023	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}	100	V	
Gate-source Voltage	V_{GS}	± 20	V	
Drain current	I_D	$T_C=25^\circ\text{C}$ Silicon Limited	302	A
		$T_C=25^\circ\text{C}$ Package Limited	300	A
		$T_C=100^\circ\text{C}$ Silicon Limited	214	A
¹⁾ Pulsed drain current	I_{DM}	1200	A	
Total power dissipation	P_{tot}	$T_C=25^\circ\text{C}$	441	W
		$T_C=100^\circ\text{C}$	221	W
²⁾ Avalanche energy, single pulse	E_{AS}	481	mJ	
Operating and storage temperature	T_j, T_{stg}	- 55 ~ 175	$^\circ\text{C}$	

Thermal characteristics

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

Notes

- Pulse width limited by T_{jmax}
- EAS is tested at starting $T_j = 25^\circ\text{C}$, $L = 1.0\text{mH}$, $I_{AS} = 31\text{A}$, $V_{DD} = 50\text{V}$, $V_{GS} = 10\text{V}$
- 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, I _D =100 A, R _{G,ext} =3Ω
Rise time	t _r	-	20	-	ns	V _{DD} =50 V, V _{GS} =10 V, I _D =100 A, R _{G,ext} =3Ω
Turn-off delay time	t _{d(off)}	-	108	-	ns	V _{DD} =50 V, V _{GS} =10 V, I _D =100 A, R _{G,ext} =3Ω
Fall time	t _f	-	40	-	ns	V _{DD} =50 V, V _{GS} =10 V, I _D =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 continuous forward current	I _S	-	-	300	A	-
Diode pulse current	I _{S,pulse}	-	-	1200	A	pulsed; t _p ≤ 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 _I /dt=100 A/μs
Reverse recovery charge	Q _{rr}	-	422	-	nC	I _F =100 A, d _I /dt=100 A/μs

Electrical characteristics diagrams

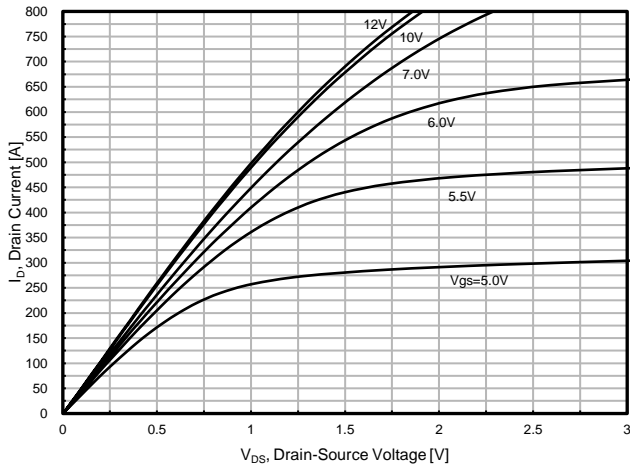


Fig. 1. Output Characteristics

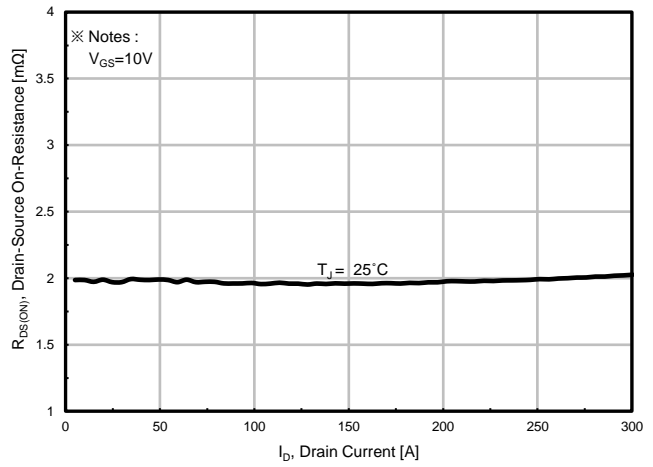


Fig. 2. Static On-Resistance Variation

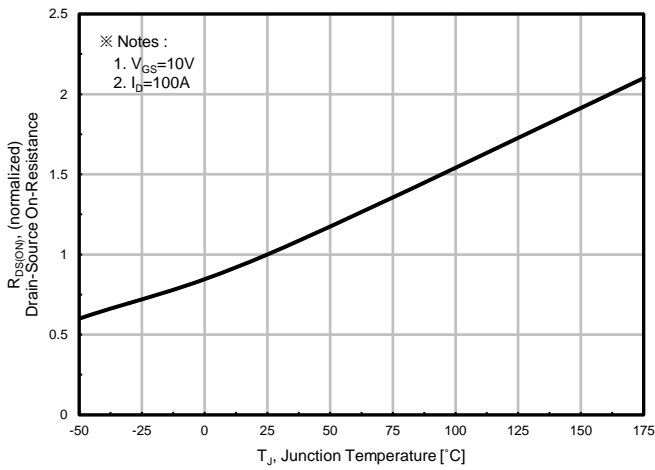


Fig. 3. On-Resistance vs. Junction Temperature

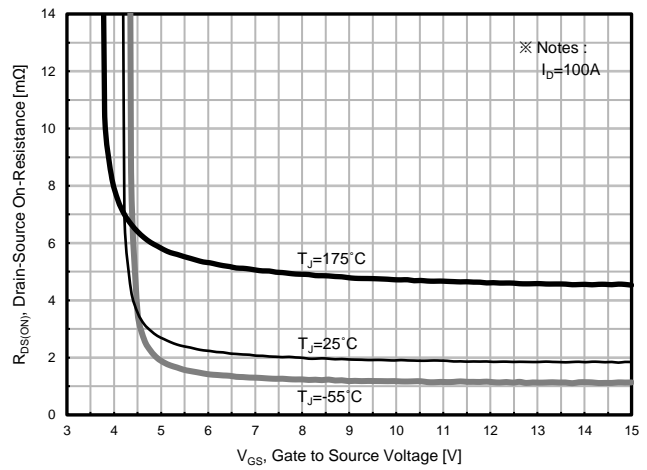


Fig. 4. On-Resistance vs. Gate to Source Voltage

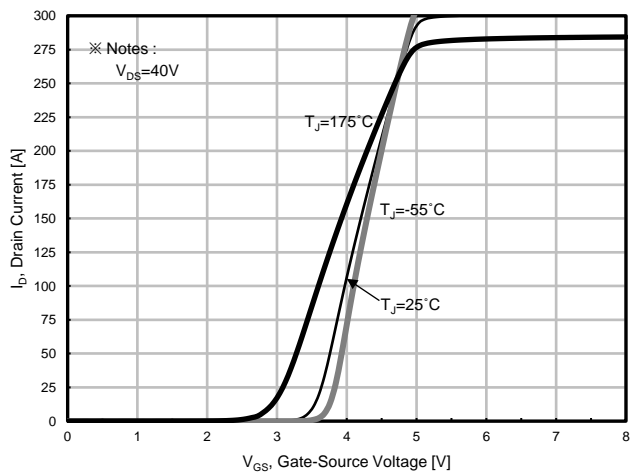


Fig. 5. Transfer Characteristics

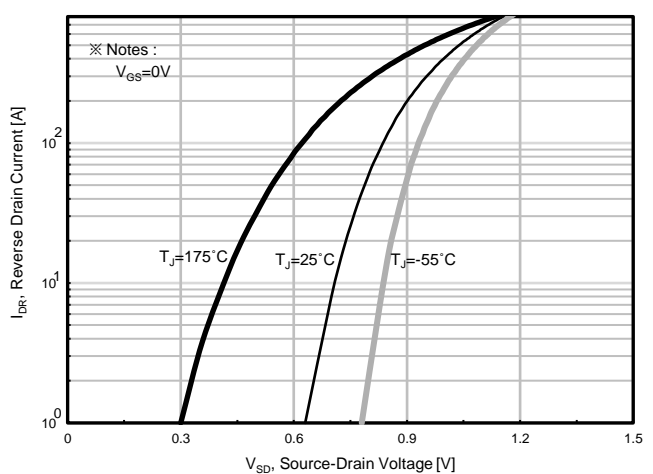


Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Electrical characteristics diagrams

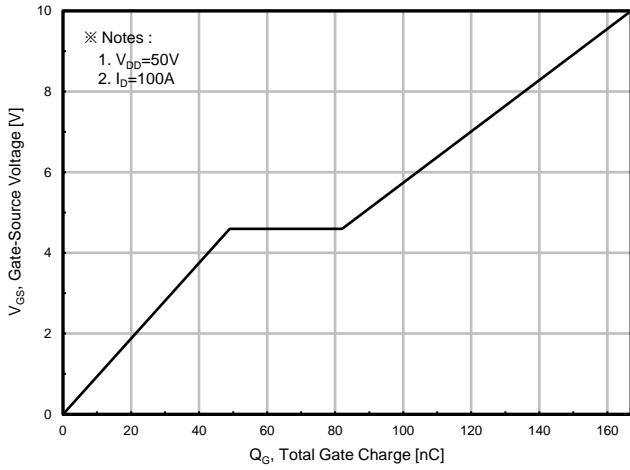


Fig. 7. Gate Charge

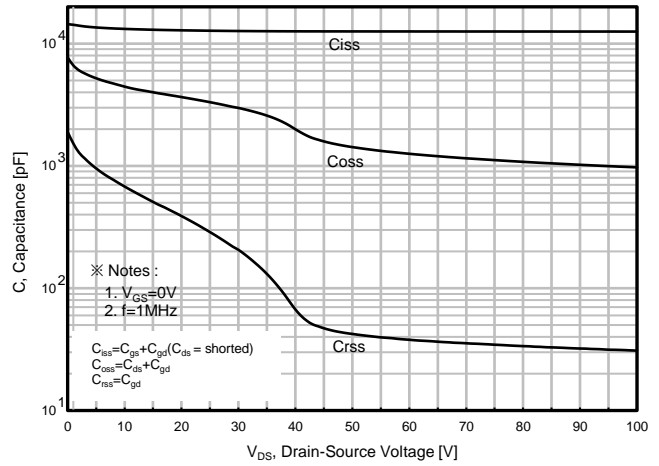


Fig. 8. Capacitances

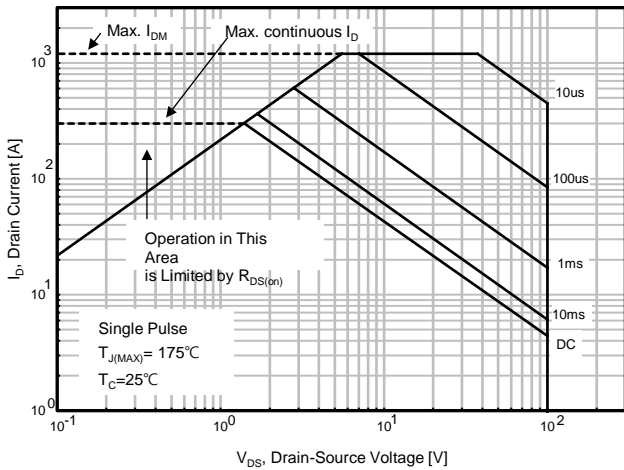


Fig. 9. Safe Operating Area

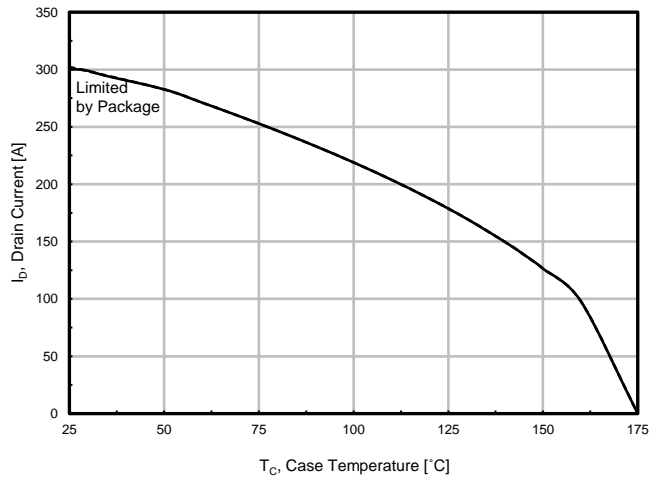


Fig. 10. Maximum Drain Current vs. Case Temperature

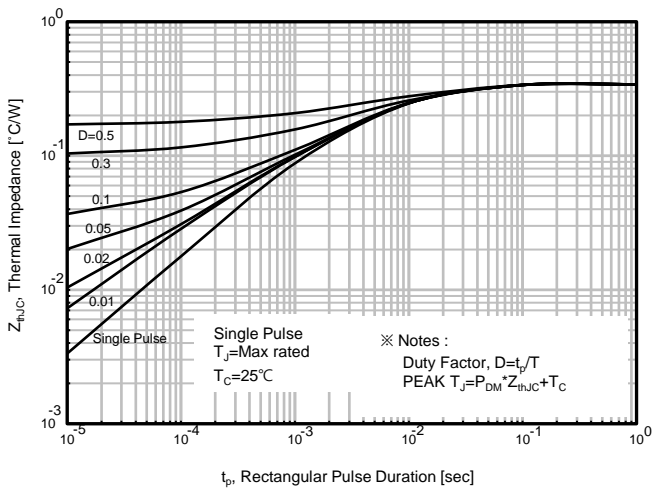
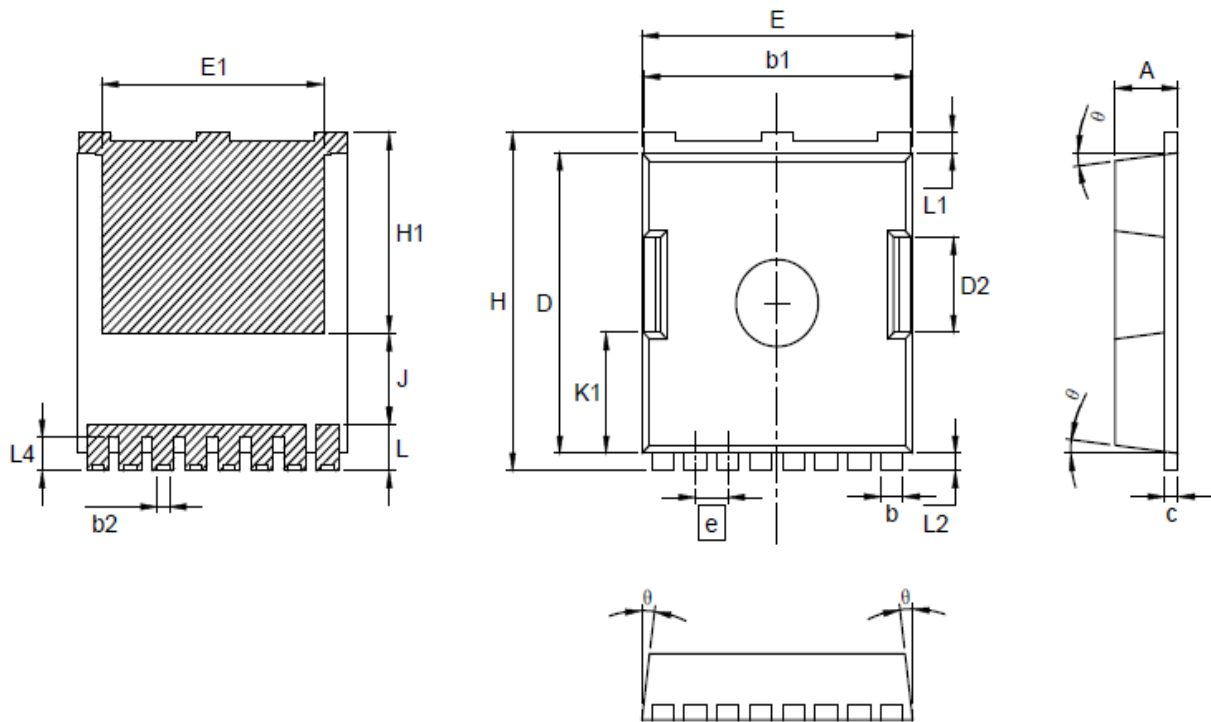


Fig. 11. Transient Thermal Impedance

Package information

TOLL




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.

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