



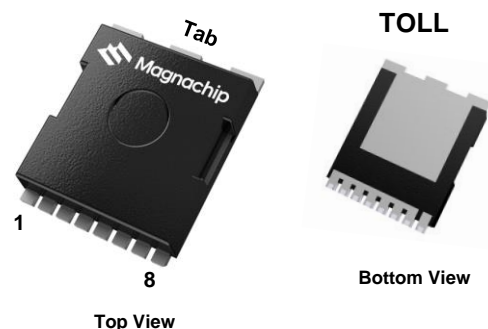
MDT14N043RH

Single N-channel Trench MOSFET 135V 4.3mΩ 201A

General description

The MDT14N043RH 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

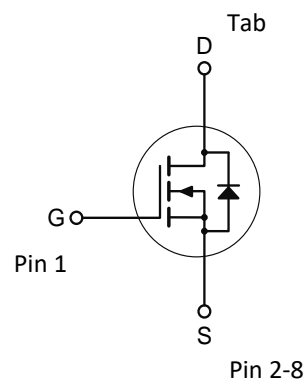
- Magnachip's MOSFET Technology
- Very low on-resistance $R_{DS(on)}$
- 100% Avalanche / R_g / ΔV_{DS} Tested

Applications

- Motor Inverter
- Battery Management
- Power Inverter

Key performance parameters

V_{DS}	135	V
$R_{DS(on), max}$	0.0043	Ω
I_D	201	A
Q_G	137	nC
Junction temperature _{max}	175	$^{\circ}C$



Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDT14N043RH	TOLL	MDT14N043	Tape & Reel	Halogen Free

<http://www.magnachip.com>

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

Parameter		Symbol	Rating	Unit
Drain-source Voltage		V_{DS}	135	V
Gate-source Voltage		V_{GS}	± 20	V
Drain current	$T_C=25^\circ\text{C}$ Silicon Limited	I_D	201	A
	$T_C=100^\circ\text{C}$ Silicon Limited		142	A
¹⁾ Pulsed drain current	$T_C=25^\circ\text{C}$	I_{DM}	804	A
Total power dissipation	$T_C=25^\circ\text{C}$	P_{tot}	469	W
	$T_C=100^\circ\text{C}$		234	W
²⁾ Avalanche energy, single pulse		E_{AS}	450	mJ
Operating and storage temperature		T_j, T_{stg}	- 55 ~ 175	$^\circ\text{C}$

Thermal characteristics

Parameter		Symbol	Rating	Unit
Thermal resistance, junction - case		$R_{\theta JC}$	0.32	$^\circ\text{C}/\text{W}$
³⁾ Thermal resistance, junction - ambient		$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$

Notes

- Pulse width limited by T_{jmax}
- EAS is tested at starting $T_J = 25^\circ\text{C}$, $L = 1.0\text{mH}$, $I_{AS} = 30\text{A}$, $V_{DD} = 50\text{V}$, $V_{GS} = 10\text{V}$
- Surface mounted FR-4 board by JEDEC (jesd51-7)

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

Static characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	$V_{(BR)DSS}$	135	-	-	V	$V_{GS}=0\text{ V}$, $I_D=250\ \mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2.5	-	3.9	V	$V_{DS}=V_{GS}$, $I_D=250\ \mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=135\text{ V}$, $V_{GS}=0\text{ V}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	3.6	4.3	m Ω	$V_{GS}=10\text{ V}$, $I_D=100\text{ A}$
Gate resistance	R_G	-	3.0	-	Ω	$f=1\text{ MHz}$
Transconductance	g_{fs}	-	120	-	S	$V_{DS}=10\text{ V}$, $I_D=100\text{ A}$

Dynamic characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C_{iss}	-	10,008	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=70\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	916	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=70\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rfs}	-	20	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=70\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	41	-	ns	$V_{DD}=70\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\ \Omega$
Rise time	t_r	-	22	-	ns	$V_{DD}=70\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\ \Omega$
Turn-off delay time	$t_{d(off)}$	-	101	-	ns	$V_{DD}=70\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\ \Omega$
Fall time	t_f	-	22	-	ns	$V_{DD}=70\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\ \Omega$

Gate charge characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	52	-	nC	$V_{DD}=70\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{gs(th)}$	-	46	-	nC	$V_{DD}=70\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}	-	27	-	nC	$V_{DD}=70\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	40	-	nC	$V_{DD}=70\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total	Q_g	-	137	-	nC	$V_{DD}=70\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.8	-	V	$V_{DD}=70\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$

Source-drain diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continuous forward current	I_S	-	-	201	A	-
Diode pulse current	$I_{S,pulse}$	-	-	804	A	pulsed; $t_p \leq 10\ \mu\text{s}$
Diode forward voltage	V_{SD}	-	1.0	1.2	V	$V_{GS}=0\text{ V}$, $I_F=100\text{ A}$
Reverse recovery time	t_{rr}	-	137	-	ns	$I_F=100\text{ A}$, $dI_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	540	-	nC	$I_F=100\text{ A}$, $dI_F/dt=100\text{ A}/\mu\text{s}$

Electrical characteristics diagrams

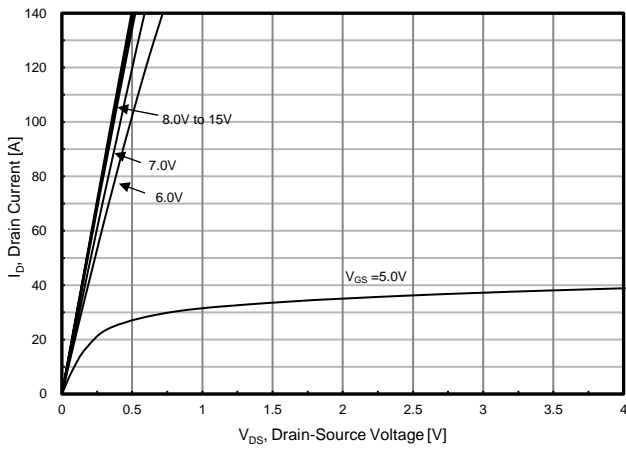


Fig. 1. On-Region Characteristics

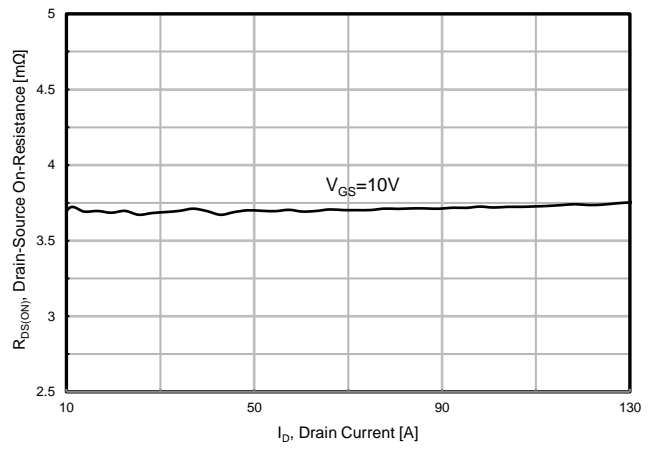


Fig. 2. On-Resistance vs. Drain Current and Gate Voltage

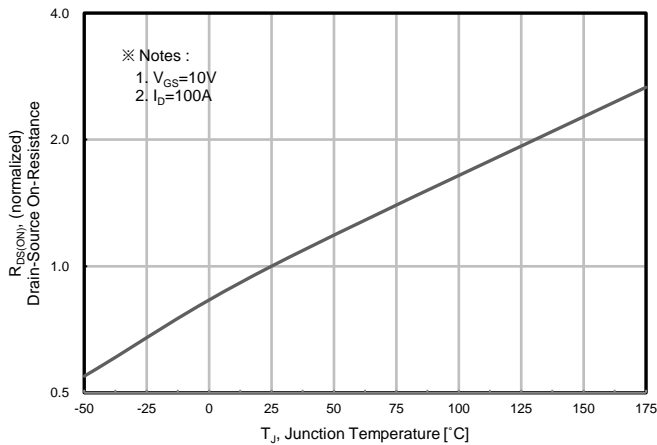


Fig. 3. On-Resistance vs. Junction Temperature

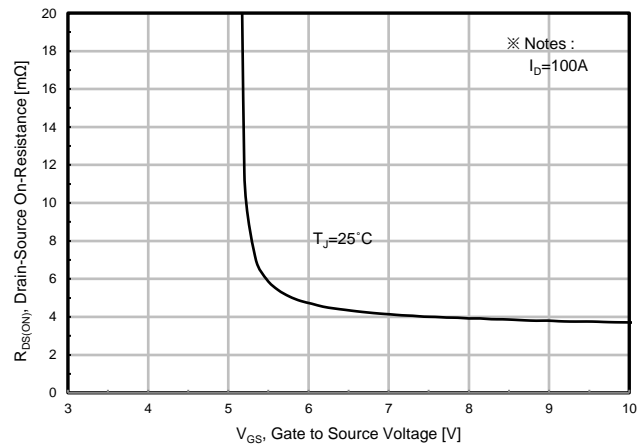


Fig. 4. On-Resistance vs. Gate to Source Voltage

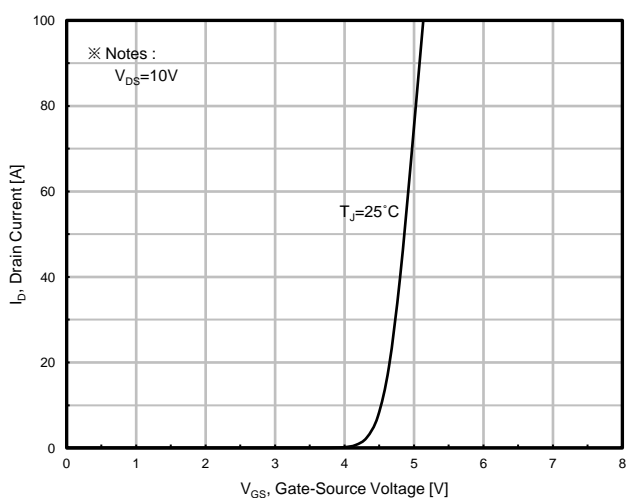


Fig. 5. Transfer Characteristics

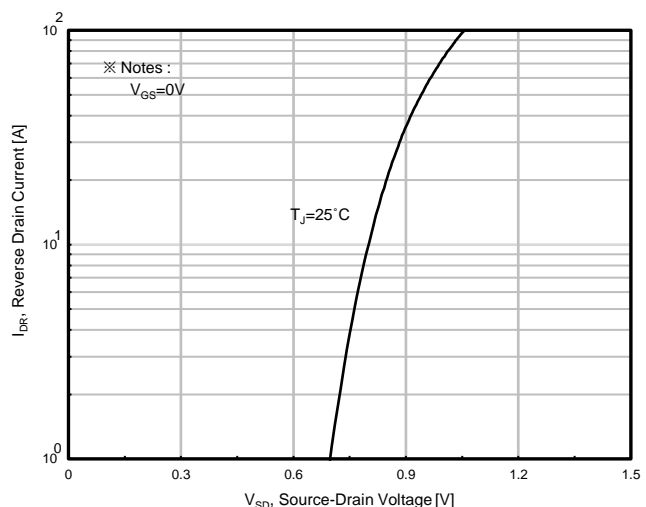


Fig. 6. Source-Drain Diode Forward Voltage

Electrical characteristics diagrams

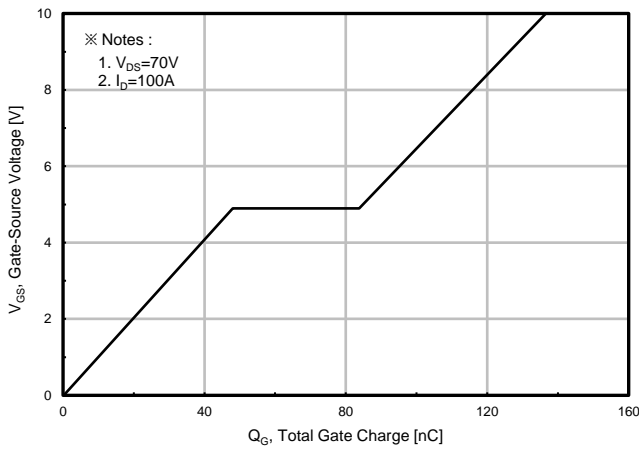


Fig. 7. Gate Charge

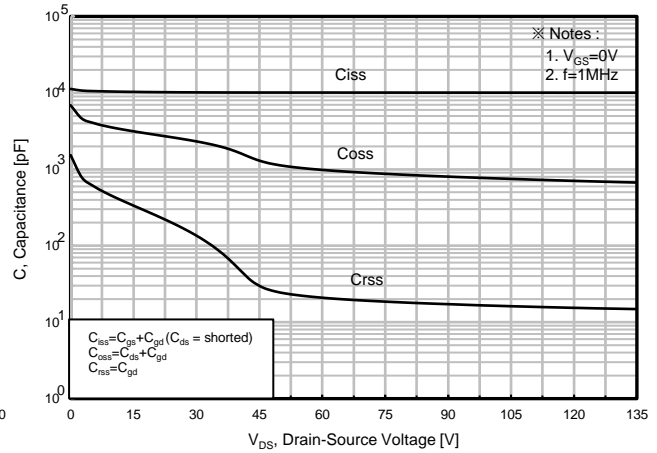


Fig. 8. Capacitance

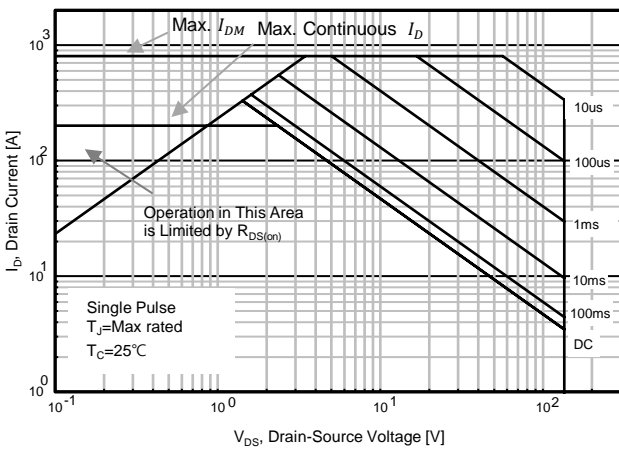


Fig. 9. Safe Operating Area, Junction-to-Ambient

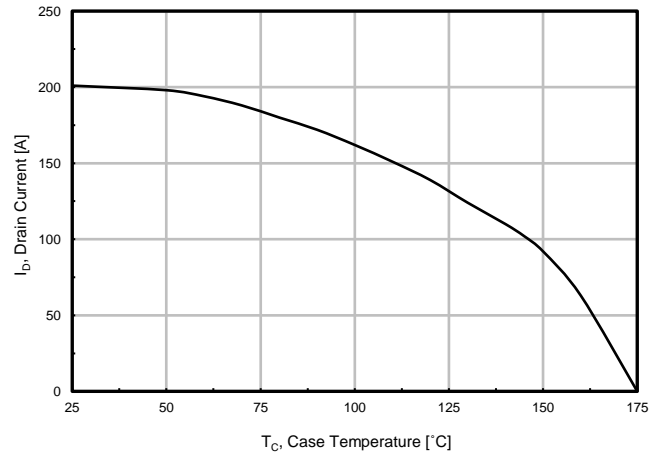


Fig. 10. Maximum Drain vs. Case Temperature

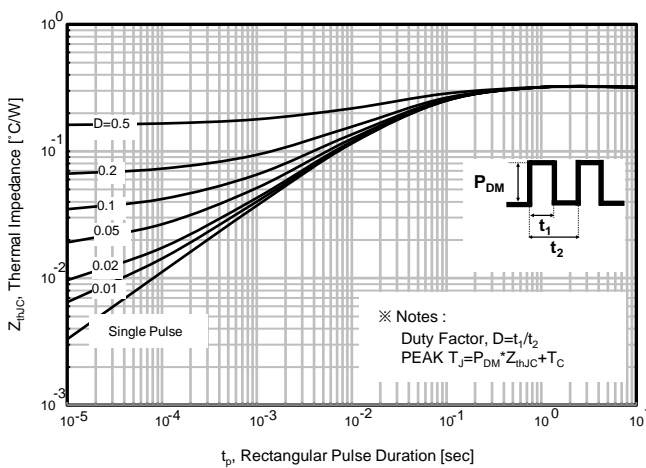
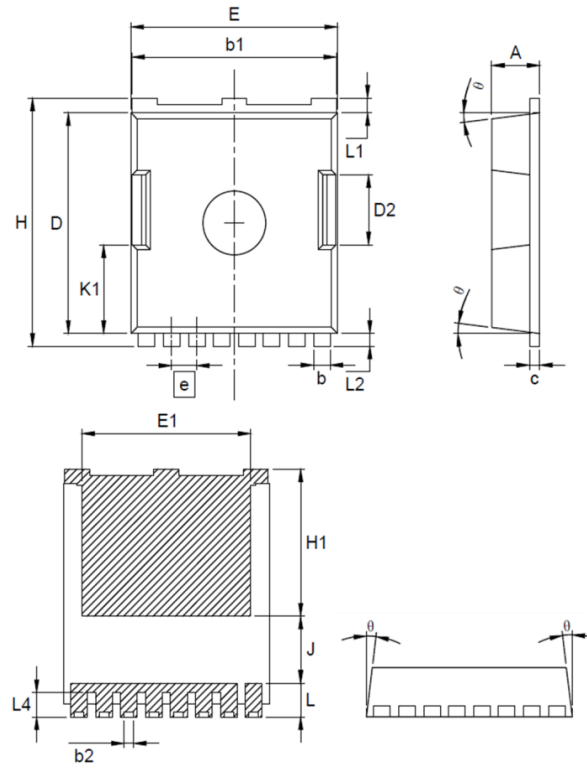


Fig. 11. Thermal Transient Impedance, Junction-to-Ambient

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	0,42	-	0,50
c	0,40	-	0,60
D	10,28	-	10,58
D2	3,10	3,30	3,50
E	9,70	9,90	10,10
E1	7,90	8,10	8,30
e	BSC 1,20		
H	11,48	11,68	11,90
H1	BSC 6,95		
J	BSC 3,15		
K1	3,98	4,18	4,38
L	1,38	1,60	1,80
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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