



# MDT15N054PTRH

## Single N-channel Trench MOSFET 150V 5.4mΩ 167A

### FEATURES

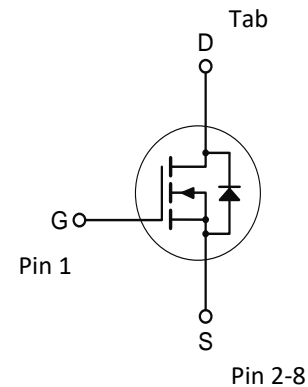
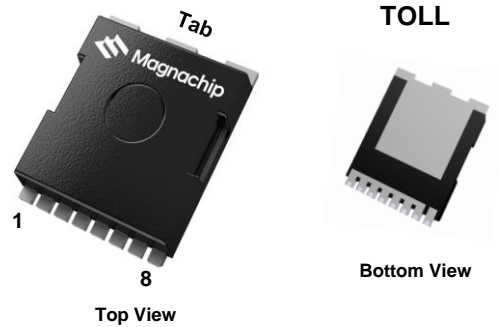
- Trench power MOSFET technology
- N-channel, normal level
- Enhanced avalanche ruggedness
- 100% Avalanche tested
- Maximum 175°C junction temperature

### APPLICATIONS

- DC/DC and AC/DC converters
- Brushed and BLDC Motor drive systems
- Load switch

### KEY PERFORMANCE PARAMETERS

$V_{DS}$	150	V
$R_{DS(on), typ.}$	0.00463	$\Omega$
$I_D$	167	A
$Q_G, typ.$	90	nC
Junction temperature, $max.$	175	$^{\circ}C$



### ORDERING INFORMATION

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDT15N054PTRH	TOLL	MDT15N054	Tape & Reel	Halogen Free

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

**ABSOLUTE MAXIMUM RATINGS**, at  $T_J = 25^\circ\text{C}$ , unless otherwise s

PARAMETER		SYMBOL	RATING	UNIT
Drain-source Voltage		$V_{DS}$	150	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain current	$T_C=25^\circ\text{C}$	$I_D$	167	A
	$T_C=100^\circ\text{C}$		118	A
<sup>1)</sup> Pulsed drain current	$T_C=25^\circ\text{C}$	$I_{DM}$	668	A
Total power dissipation	$T_C=25^\circ\text{C}$	$P_{tot}$	395	W
	$T_C=100^\circ\text{C}$		197	W
<sup>2)</sup> Avalanche energy, single pulse		$E_{AS}$	421	mJ
Operating and storage temperature		$T_j, T_{stg}$	- 55 ~ 175	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

PARAMETER		SYMBOL	RATING	UNIT
Thermal resistance, junction - case		$R_{\theta JC}$	0.38	$^\circ\text{C/W}$
<sup>3)</sup> Thermal resistance, junction - ambient		$R_{\theta JA}$	40	$^\circ\text{C/W}$

**Notes**

- Pulse width limited by  $T_{jmax}$
- Starting  $T_J=25^\circ\text{C}$ ,  $L=1\text{mH}$ ,  $I_{AS}=29\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $V_{GS}=10\text{V}$
- Surface mounted FR-4 board by JEDEC (jesd51-7)

**ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C)****STATIC CHARACTERISTICS**

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	150	-	-	V	V <sub>GS</sub> =0 V, I <sub>D</sub> =250 μA
Gate threshold voltage	V <sub>GS(th)</sub>	2.25	3.0	3.75	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 μA
Zero gate voltage drain current	I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =150 V, V <sub>GS</sub> =0 V
Gate-source leakage current	I <sub>GSS</sub>	-	-	± 100	nA	V <sub>GS</sub> =±20 V, V <sub>DS</sub> =0 V
Drain-source on-state resistance	R <sub>DS(on)</sub>	-	4.63	5.40	mΩ	V <sub>GS</sub> =10 V, I <sub>D</sub> =70 A
Gate resistance	R <sub>G</sub>	-	2.3	-	Ω	f=1MHz
Transconductance	g <sub>fs</sub>	-	120	-	S	V <sub>DS</sub> =20 V, I <sub>D</sub> =70 A

**DYNAMIC CHARACTERISTICS**

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C <sub>iss</sub>	-	6418	-	pF	V <sub>GS</sub> =0 V, V <sub>DS</sub> =75 V, f=1 MHz
Output capacitance	C <sub>oss</sub>	-	688	-	pF	V <sub>GS</sub> =0 V, V <sub>DS</sub> =75 V, f=1 MHz
Reverse transfer capacitance	C <sub>rss</sub>	-	15	-	pF	V <sub>GS</sub> =0 V, V <sub>DS</sub> =75 V, f=1 MHz
Turn-on delay time	t <sub>d(on)</sub>	-	31	-	ns	V <sub>DD</sub> =75 V, V <sub>GS</sub> =10 V, I <sub>D</sub> =70 A, R <sub>G,ext</sub> =3Ω
Rise time	t <sub>r</sub>	-	13	-	ns	V <sub>DD</sub> =75 V, V <sub>GS</sub> =10 V, I <sub>D</sub> =70 A, R <sub>G,ext</sub> =3Ω
Turn-off delay time	t <sub>d(off)</sub>	-	80	-	ns	V <sub>DD</sub> =75 V, V <sub>GS</sub> =10 V, I <sub>D</sub> =70 A, R <sub>G,ext</sub> =3Ω
Fall time	t <sub>f</sub>	-	17	-	ns	V <sub>DD</sub> =75 V, V <sub>GS</sub> =10 V, I <sub>D</sub> =70 A, R <sub>G,ext</sub> =3Ω

**GATE CHARGE CHARACTERISTICS**

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q <sub>gs</sub>	-	31	-	nC	V <sub>DD</sub> =75 V, I <sub>D</sub> =70 A, V <sub>GS</sub> =0 to 10 V
Gate charge at threshold	Q <sub>gs(th)</sub>	-	18	-	nC	V <sub>DD</sub> =75 V, I <sub>D</sub> =70 A, V <sub>GS</sub> =0 to 10 V
Gate to drain charge	Q <sub>gd</sub>	-	20	-	nC	V <sub>DD</sub> =75 V, I <sub>D</sub> =70 A, V <sub>GS</sub> =0 to 10 V
Switching charge	Q <sub>sw</sub>	-	33	-	nC	V <sub>DD</sub> =75 V, I <sub>D</sub> =70 A, V <sub>GS</sub> =0 to 10 V
Gate charge total	Q <sub>g</sub>	-	90	-	nC	V <sub>DD</sub> =75 V, I <sub>D</sub> =70 A, V <sub>GS</sub> =0 to 10 V
Gate plateau voltage	V <sub>plateau</sub>	-	5.3	-	V	V <sub>DD</sub> =75 V, I <sub>D</sub> =70 A, V <sub>GS</sub> =0 to 10 V

**SOURCE-DRAIN DIODE**

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continuous forward current	I <sub>S</sub>	-	-	167	A	-
Diode pulse current	I <sub>S,pulse</sub>	-	-	668	A	pulsed; t <sub>p</sub> ≤ 10 μs
Diode forward voltage	V <sub>SD</sub>	-	0.8	1.2	V	V <sub>GS</sub> =0 V, I <sub>F</sub> =70 A
Reverse recovery time	t <sub>rr</sub>	-	113	-	ns	I <sub>F</sub> =70 A, d <sub>I</sub> /dt=100 A/μs
Reverse recovery charge	Q <sub>rr</sub>	-	684	-	nC	I <sub>F</sub> =70 A, d <sub>I</sub> /dt=100 A/μs

Electrical characteristics diagrams (25 °C, unless otherwise noted)

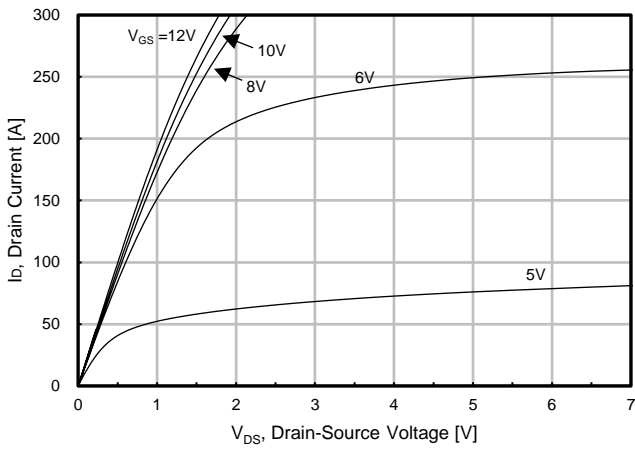


Fig. 1. Output Characteristics (25°C)

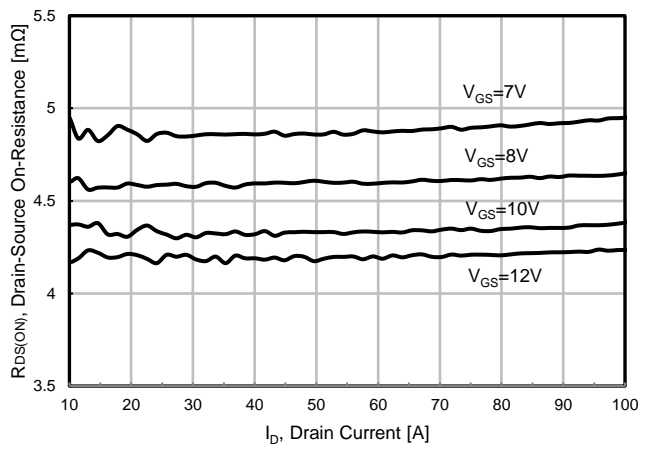


Fig. 2. Static On-Resistance Variation

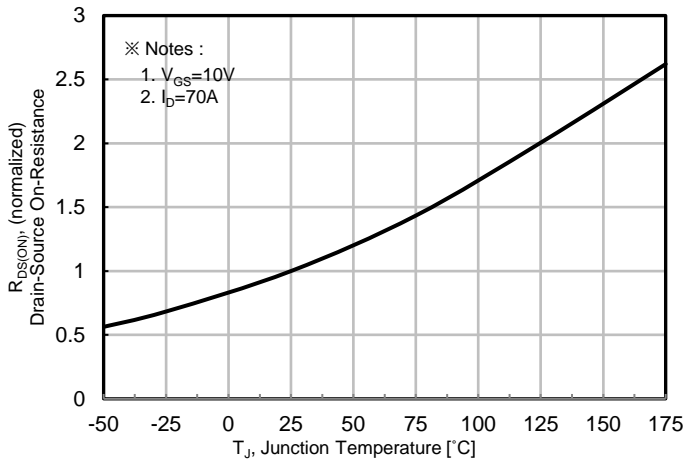


Fig. 3. On-Resistance vs. Junction Temperature

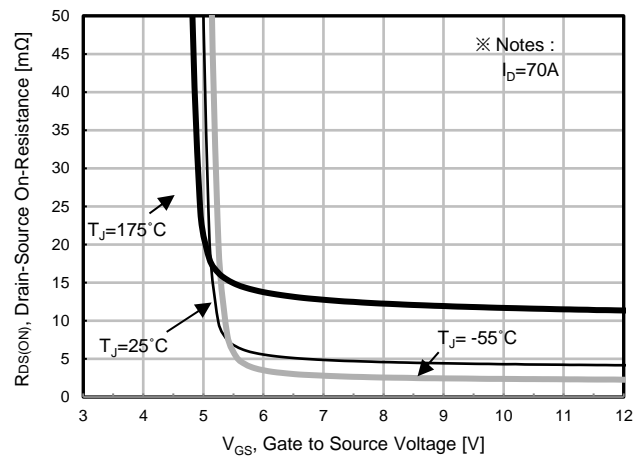


Fig. 4. On-Resistance vs. Gate to source Voltage

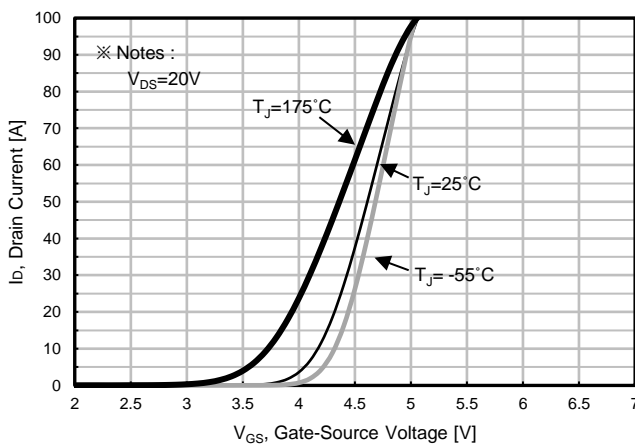


Fig. 5. Transfer Characteristics

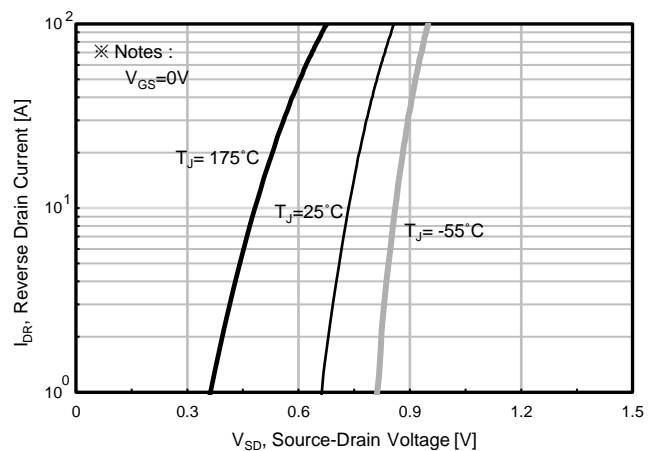
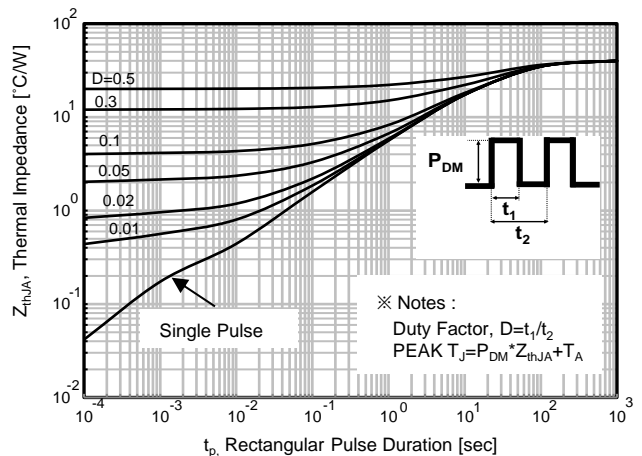
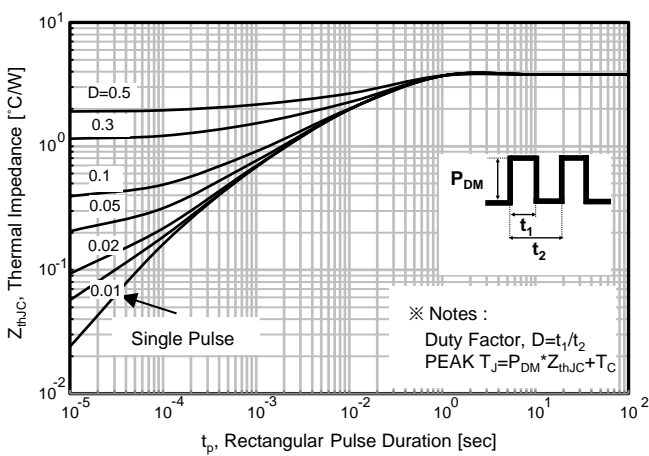
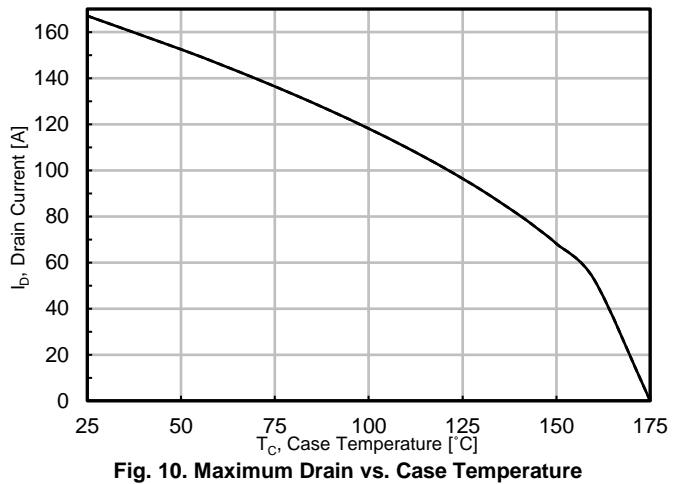
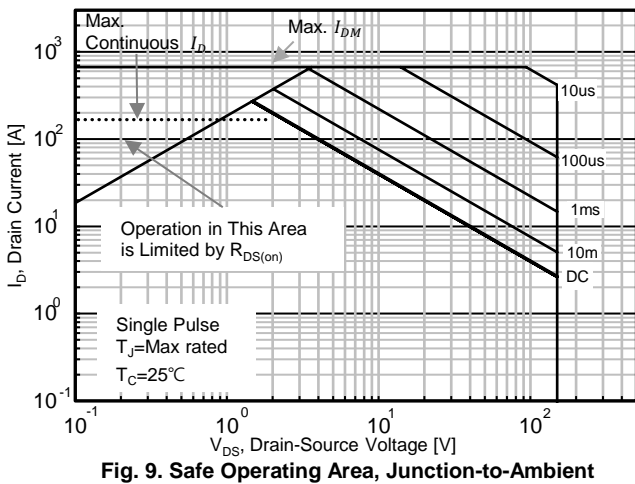
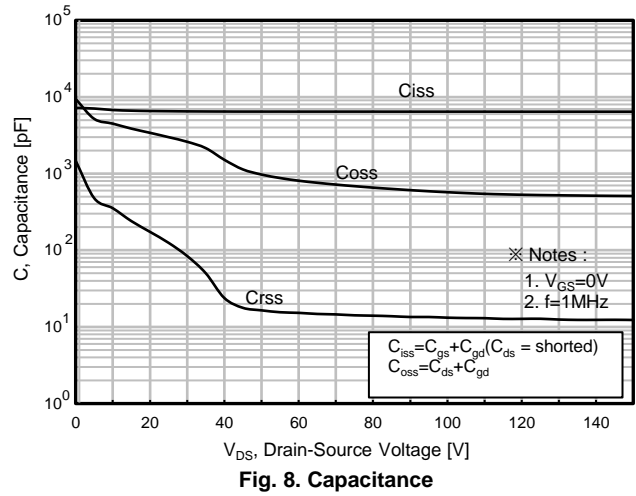
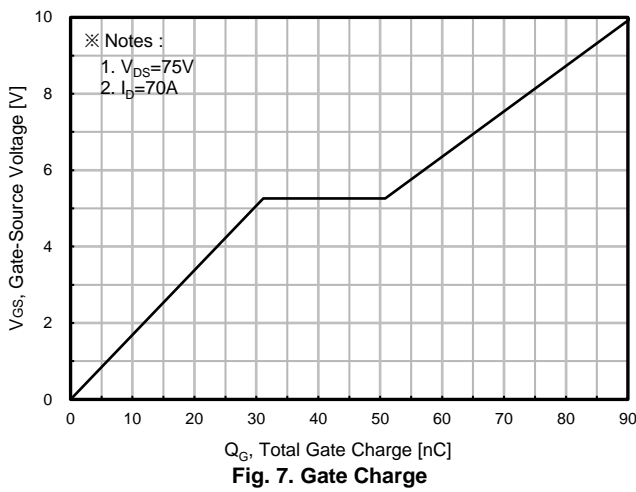


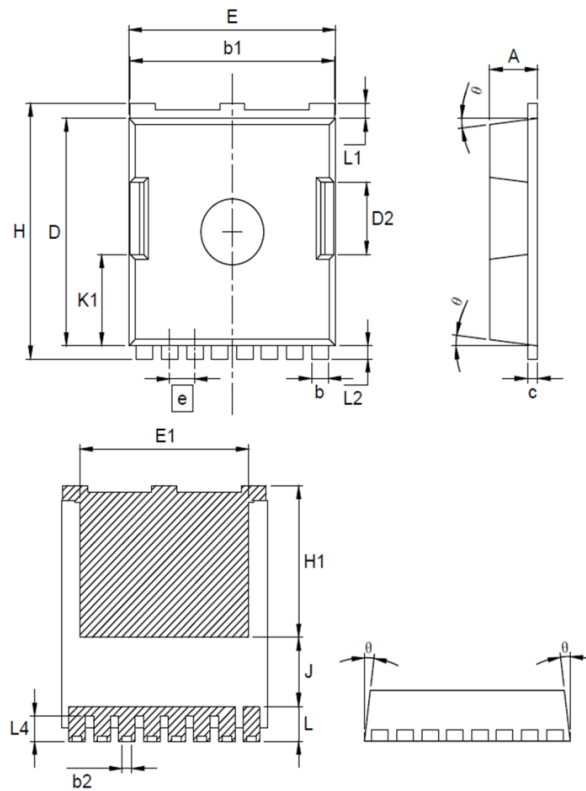
Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Electrical characteristics diagrams (25 °C, unless otherwise noted)



# 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
$\theta$	4°	7°	10°

### Notes

Package body size, length and width do not include mold flash, protrusions and gate burrs.

**DISCLAIMER :**

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