



MDT15N054PTRH

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

FEATURES

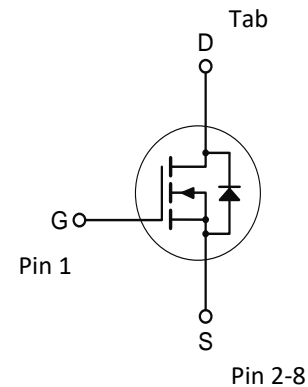
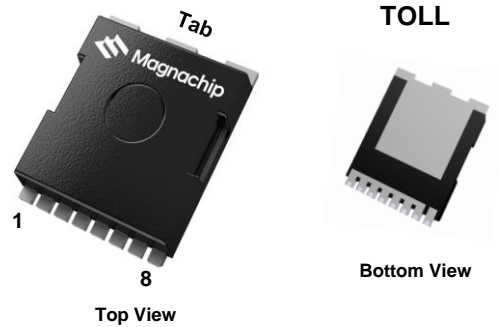
- Trench power MOSFET technology
- N-channel, normal level
- Enhanced avalanche ruggedness
- 100% Avalanche tested
- Maximum 175°C junction temperature

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	Ω
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}	± 20	V
Drain current	$T_C=25^\circ\text{C}$	I_D	167	A
	$T_C=100^\circ\text{C}$		118	A
¹⁾ 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
²⁾ 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	$^\circ\text{C}/\text{W}$
³⁾ Thermal resistance, junction - ambient		$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$

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_J = 25°C)

STATIC CHARACTERISTICS

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	V _{(BR)DSS}	150	-	-	V	V _{GS} =0 V, I _D =250 μA
Gate threshold voltage	V _{GS(th)}	2.25	3.0	3.75	V	V _{DS} =V _{GS} , I _D =250 μA
Zero gate voltage drain current	I _{DSS}	-	-	1	μA	V _{DS} =150 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)}	-	4.63	5.40	mΩ	V _{GS} =10 V, I _D =70 A
Gate resistance	R _G	-	2.3	-	Ω	f=1MHz
Transconductance	g _{fs}	-	120	-	S	V _{DS} =20 V, I _D =70 A

DYNAMIC CHARACTERISTICS

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

GATE CHARGE CHARACTERISTICS

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

SOURCE-DRAIN DIODE

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

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

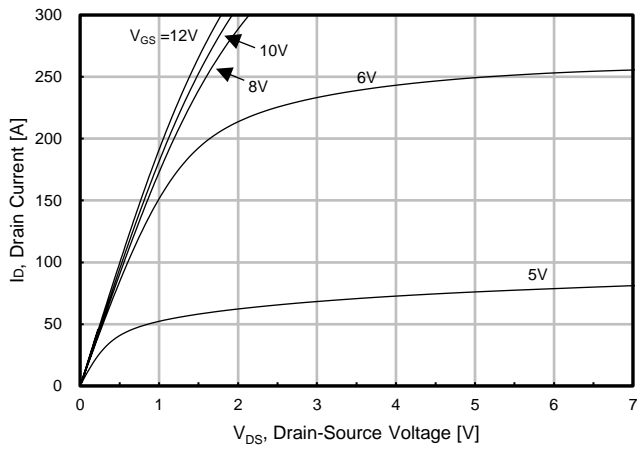


Fig. 1. Output Characteristics (25°C)

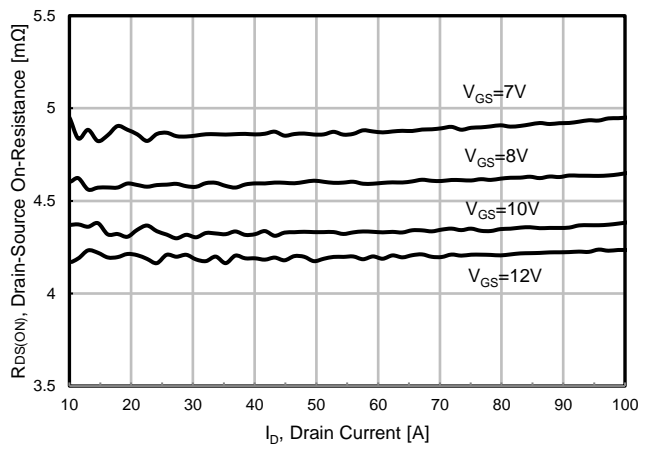


Fig. 2. Static On-Resistance Variation

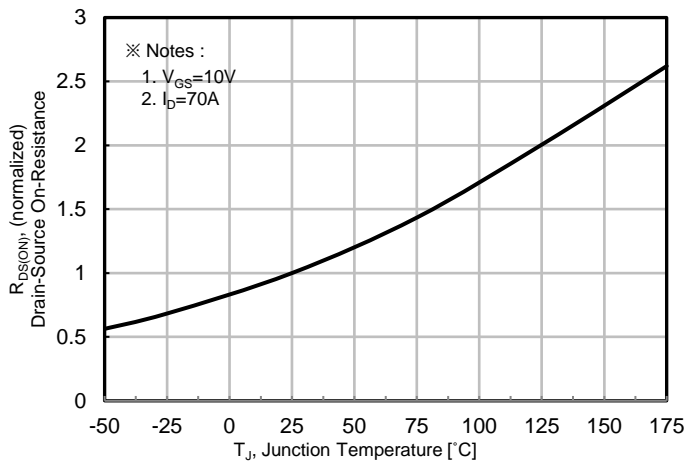


Fig. 3. On-Resistance vs. Junction Temperature

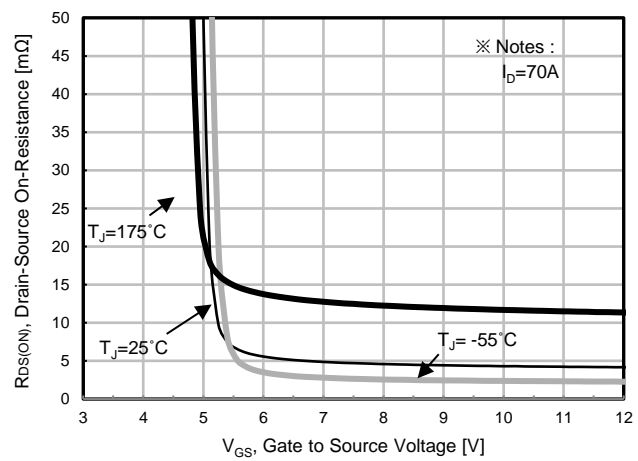


Fig. 4. On-Resistance vs. Gate to source Voltage

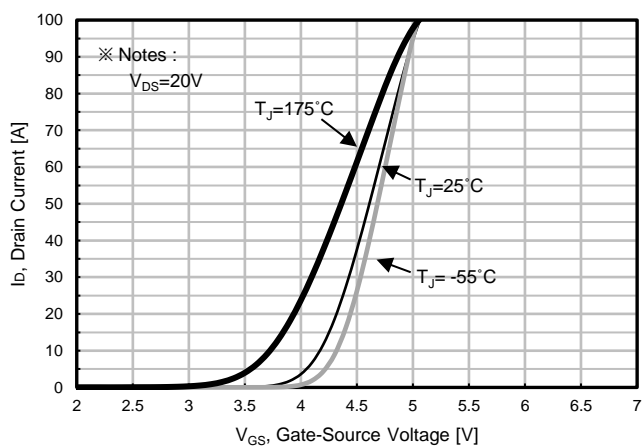


Fig. 5. Transfer Characteristics

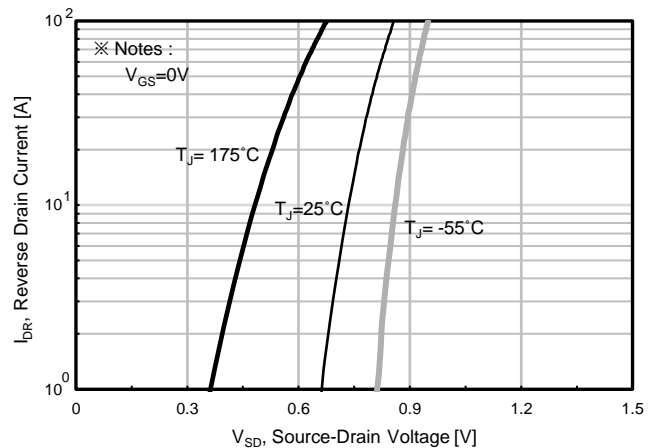
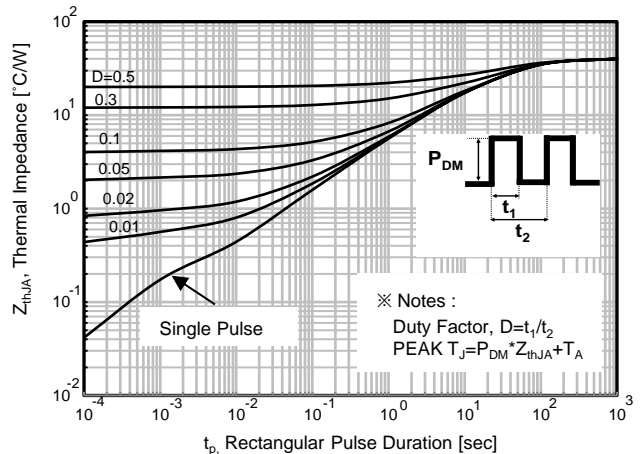
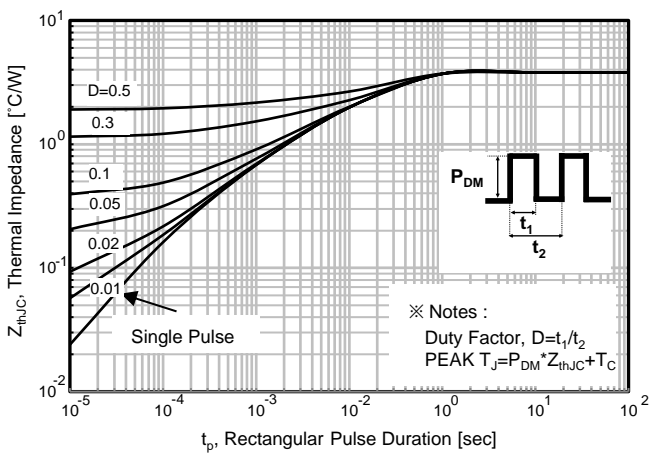
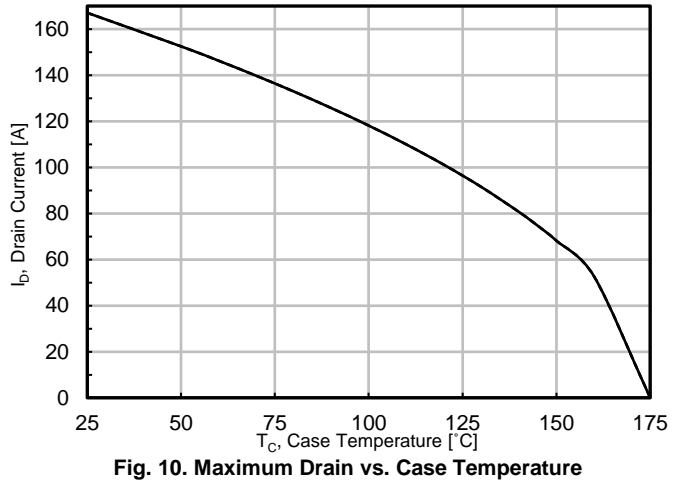
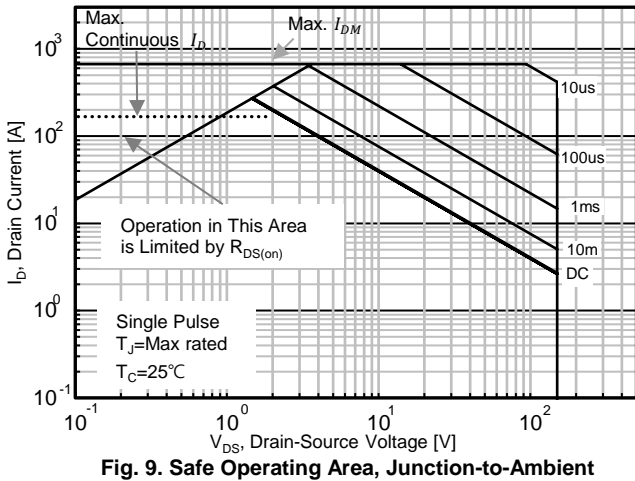
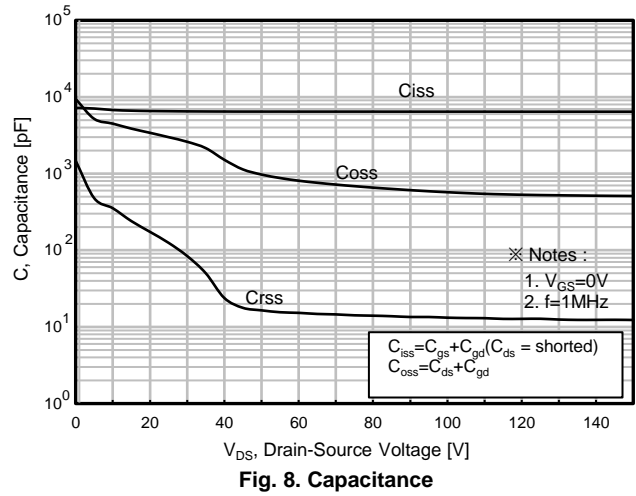
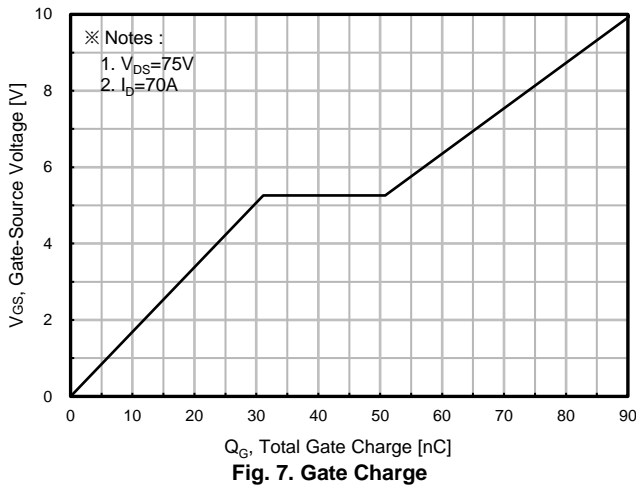


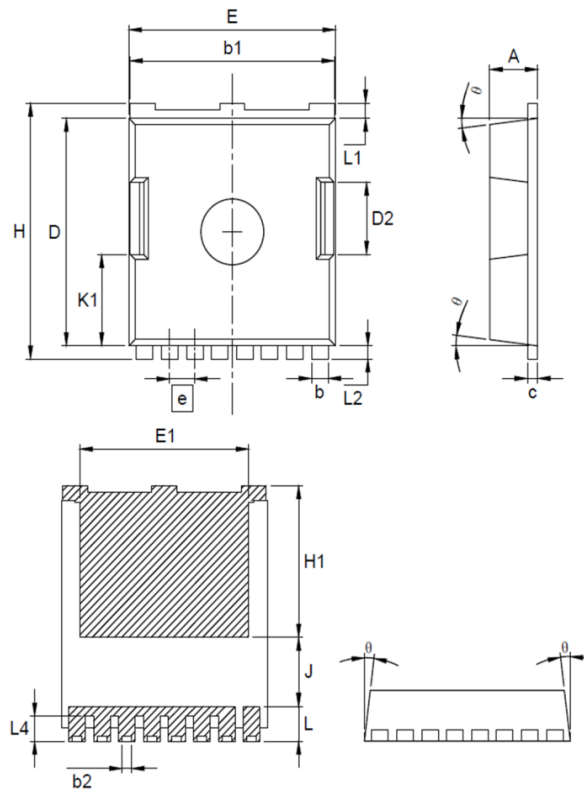
Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

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
θ	4°	7°	10°

Notes

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

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