



MDY10N025RH

Single N-channel Trench MOSFET 100V 2.5mΩ 240A

General description

The MDY10N025RH uses advanced MagnaChip's MV MOSFET Technologies, which provides high performance in on-state resistance, fast switching, parallel performance, and excellent quality.

MDY10N025RH(M2PAK) is the best solution for high power application where thermal behavior.

MDY10N025RH is suitable device for Motor Drive, Li-ion Battery Management system and general purpose applications.

Features and benefits

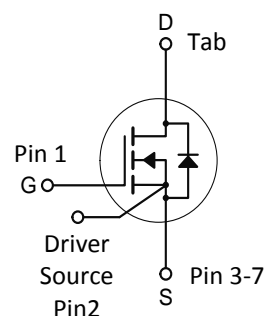
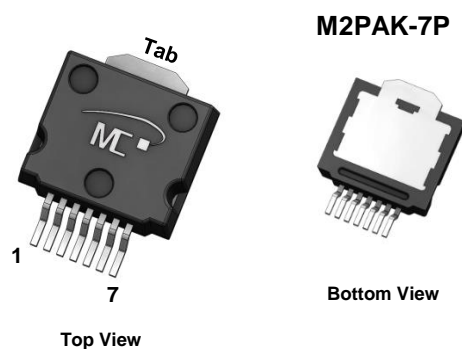
- Very low on-resistance $R_{DS(on)}$
- 100% Avalanche / R_g / ΔV_{DS} Tested
- High Reliability Package Solution

Applications

- Motor Inverter
- Battery Management
- Power Inverter

Key performance parameters

V_{DS}	100	V
$R_{DS(on), max}$	0.0025	Ω
I_D	240	A
Q_G	167	nC
Junction temperature, $_{max}$	175	$^{\circ}C$



Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDY10N025RH	M2PAK-7P	10N025	Tape & Reel	Halogen Free

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



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

Parameter	Symbol	Rating	Unit	
Drain-source Voltage	V_{DS}	100	V	
Gate-source Voltage	V_{GS}	± 20	V	
1) Drain current	I_D	$T_C=25^\circ\text{C}$ Silicon Limited	306	A
		$T_C=25^\circ\text{C}$ Package Limited	240	A
		$T_C=100^\circ\text{C}$ Silicon Limited	217	A
2) Pulsed drain current	I_{DM}	960	A	
Total power dissipation	P_{tot}	$T_C=25^\circ\text{C}$	469	W
		$T_C=100^\circ\text{C}$	234	W
3) Avalanche energy, single pulse	E_{AS}	613	mJ	
Operating and storage temperature	T_j, T_{stg}	- 55 ~ 175	$^\circ\text{C}$	

Thermal characteristics

Parameter	Symbol	Rating	Unit
1) Thermal resistance, junction - case	$R_{\theta JC}$	0.32	$^\circ\text{C}/\text{W}$
Thermal resistance, junction - ambient	$R_{\theta JA}$	30	$^\circ\text{C}/\text{W}$

Notes

- Surface mounted FR-4 board by JEDEC (jesd51-7)
- Pulse width limited by T_{jmax}
- EAS is tested at starting $T_j = 25^\circ\text{C}$, $L = 1.0\text{mH}$, $I_{AS} = 35\text{A}$, $V_{DD} = 50\text{V}$, $V_{GS} = 10\text{V}$

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

Static characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	$V_{GS}=0\text{ V}$, $I_D=250\ \mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2.0	2.8	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\ \mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=100\text{ V}$, $V_{GS}=0\text{ V}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	2.2	2.5	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}	-	12508	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	1457	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	14	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	33	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\Omega$
Rise time	t_r	-	21	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\Omega$
Turn-off delay time	$t_{d(off)}$	-	137	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\Omega$
Fall time	t_f	-	43	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=3\Omega$

Gate charge characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	45	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{gs(th)}$	-	39	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}	-	37	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	43	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total	Q_g	-	167	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.3	-	V	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$

Source-drain diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continuous forward current	I_S	-	-	240	A	-
Diode pulse current	$I_{S,pulse}$	-	-	960	A	pulsed; $t_p \leq 10\ \mu\text{s}$
Diode forward voltage	V_{SD}	-	0.9	1.2	V	$V_{GS}=0\text{ V}$, $I_F=100\text{ A}$
Reverse recovery time	t_{rr}	-	117	-	ns	$I_F=100\text{ A}$, $dI_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	408	-	nC	$I_F=100\text{ A}$, $dI_F/dt=100\text{ A}/\mu\text{s}$

Electrical characteristics diagrams

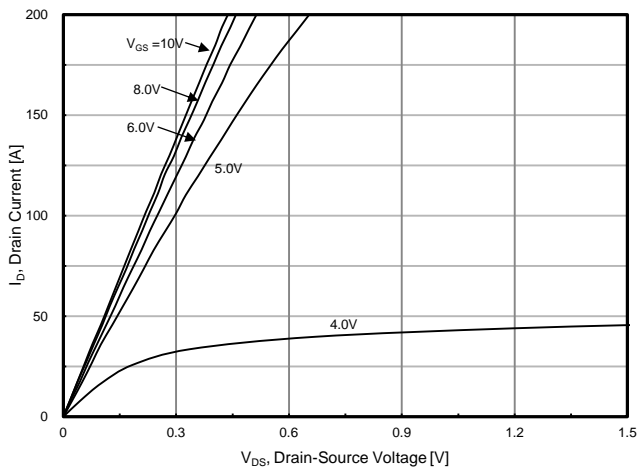


Fig. 1. On-Region Characteristics

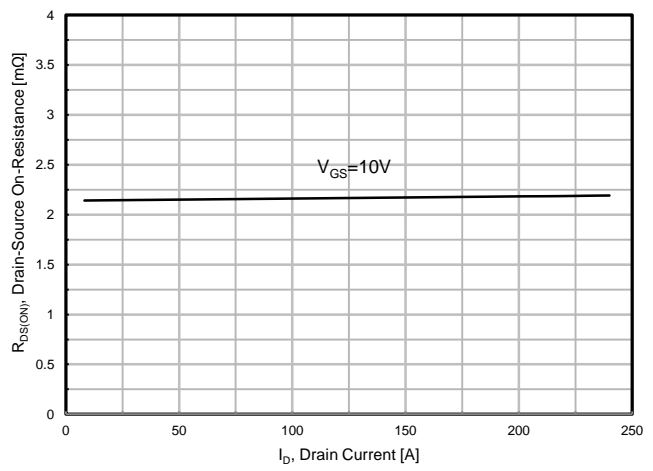


Fig. 2. On-Resistance vs. Drain Current and Gate Voltage

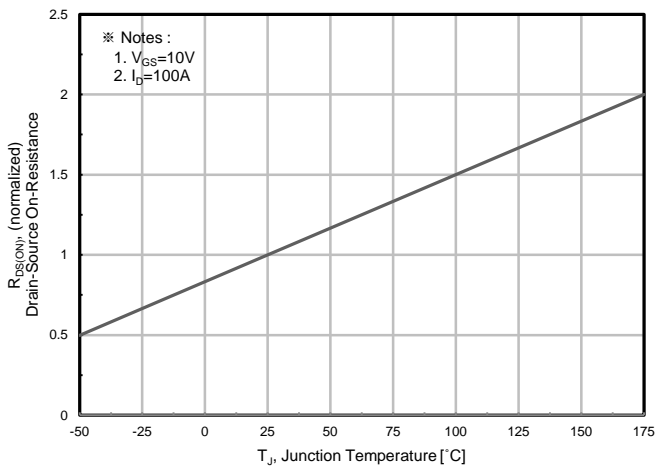


Fig. 3. On-Resistance vs. Junction Temperature

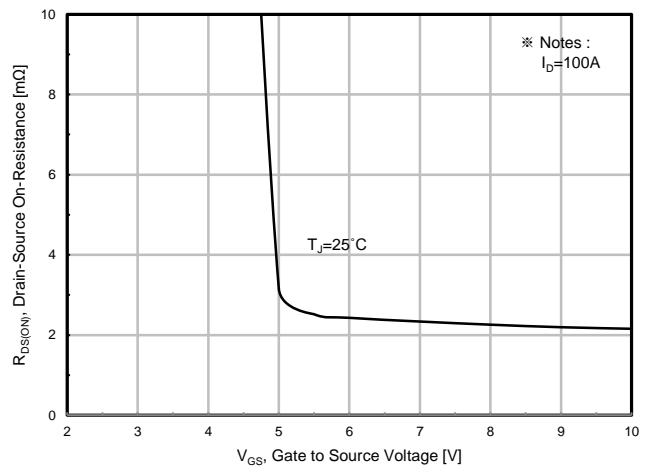


Fig. 4. On-Resistance vs. Gate to Source Voltage

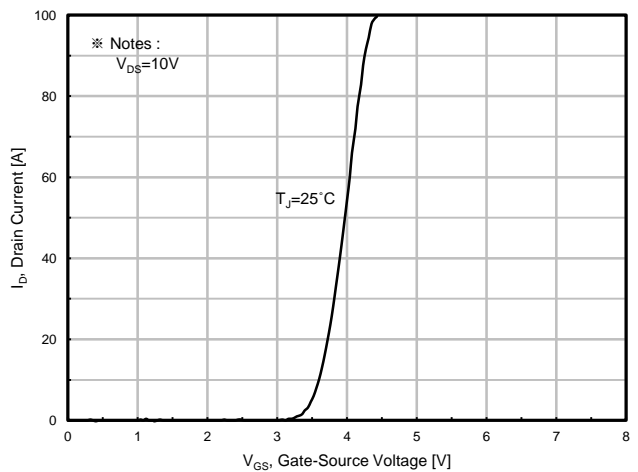


Fig. 5. Transfer Characteristics

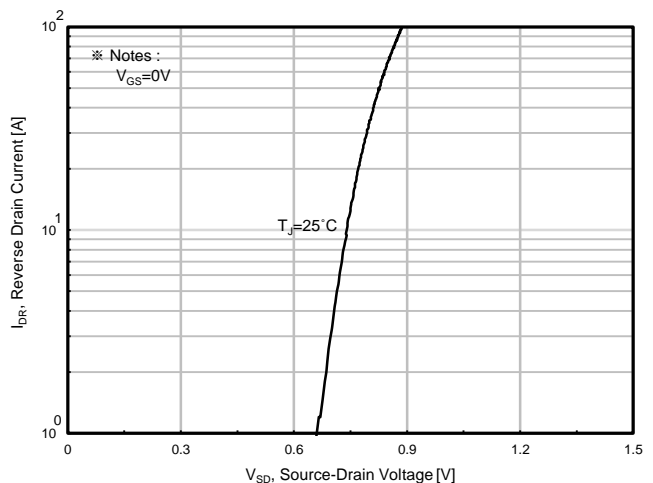


Fig. 6. Source-Drain Diode Forward Voltage

Electrical characteristics diagrams

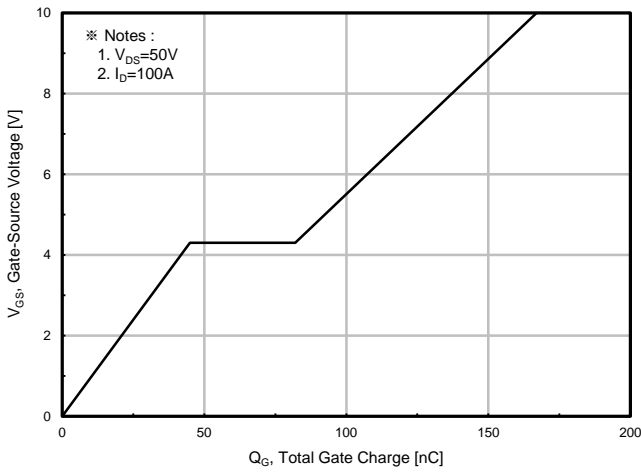


Fig. 7. Gate Charge

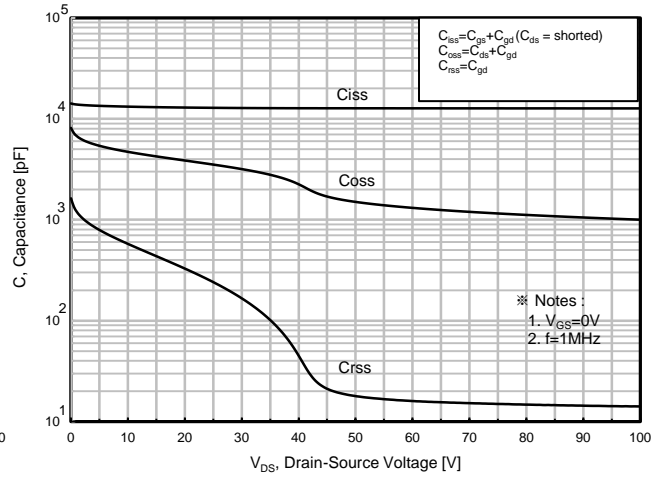


Fig. 8. Capacitance

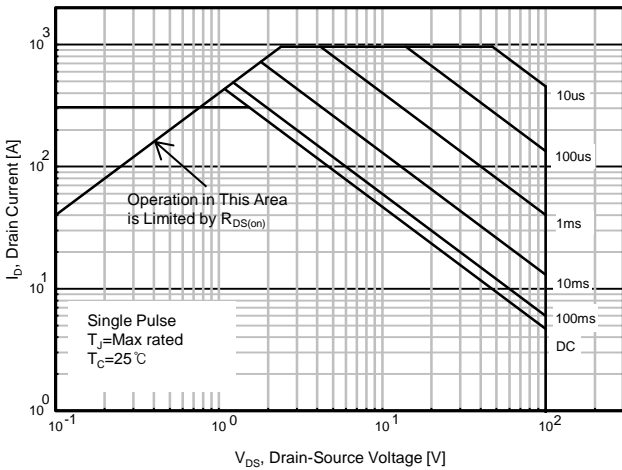


Fig. 9. Safe Operating Area, Junction-to-Case

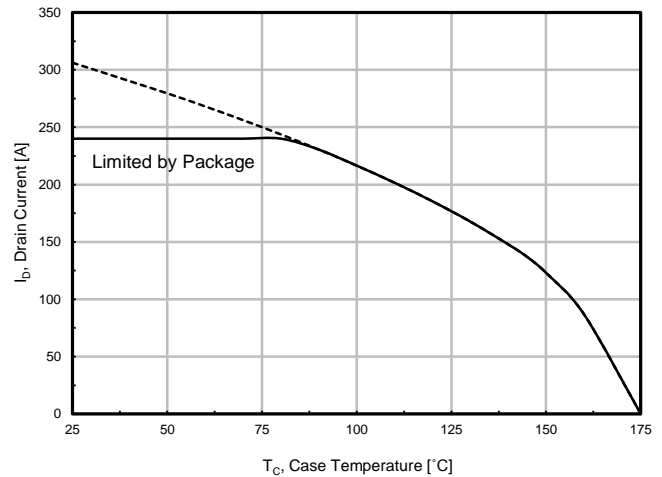


Fig. 10. Maximum Drain vs. Case Temperature

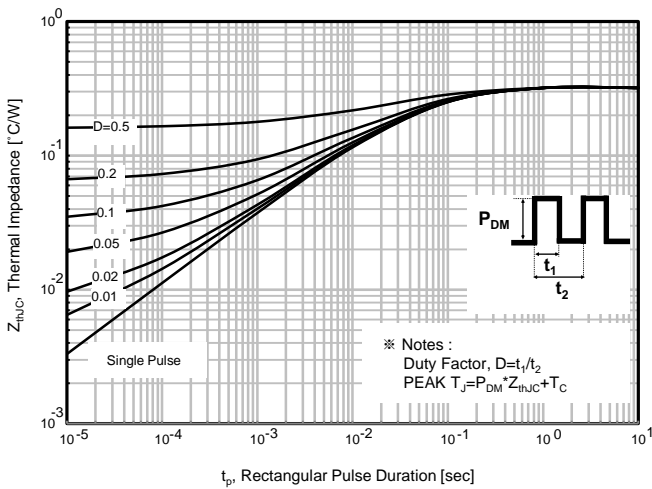
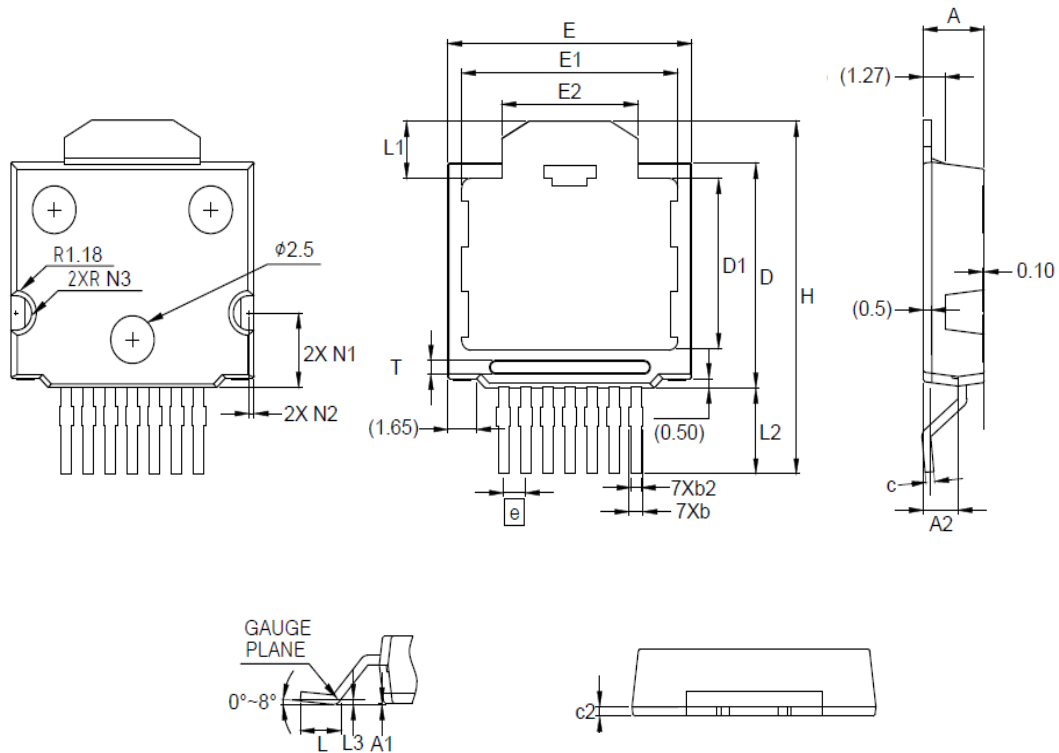


Fig. 11. Thermal Transient Impedance, Junction-to-Case

Package information

M2PAK-7P



Symbol	Dimension (mm)		
	Min	Nom	Max
A	3,40	-	3,60
A1	0,00	-	0,25
A2	1,80	-	2,20
b	0,50	-	0,70
b2	0,50	-	1,00
c	0,40	-	0,60
c2	0,40	-	0,60
D	11,70	-	11,90
D1	8,90	-	9,10
E	13,90	-	14,10
E1	12,30	-	12,50
E2	7,75	-	7,85
T	0,60		0,70
e	BSC 1,27		
H	18,00	-	19,00
L	2,22	-	2,42
L1	2,90	-	3,10
L2	4,35	-	4,65
L3	BSC 0,25		
N1	3,80	-	4,00
N2	0,25	-	0,35
N3	0,80	-	1,00

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

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