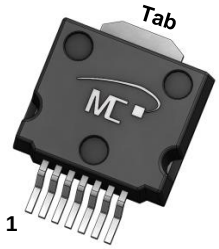
MDY14N045RH

Single N-channel Trench MOSFET 135V 4.5mΩ 228A

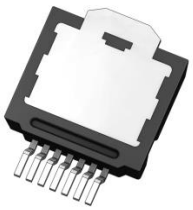
General description

MDY14N045RH uses advanced MagnaChip's MV MOSFET Technologies, which provides high performance in on-state resistance, fast switching, parallel performance and excellent quality.
MDY14N045RH is the best solution for high power application where thermal behavior.
Driver source pin avoids gate ringing and false triggering which would normally require switching loss to be limited to manage the source stray inductance of normal package.



Top View

M2PAK-7P



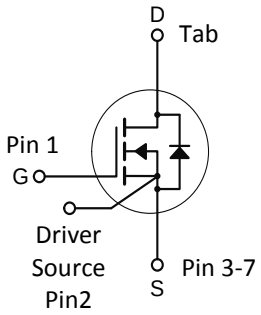
Bottom View

Features and benefits

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

Applications

- **Motor Inverter**
- **Battery Management**
- **Power Inverter**



Key performance parameters

V_{DS}	**135**	V
$R_{DS(on),\ max}$	**0.0045**	Ω
I_D	**228**	A
Q_G	**154**	nC
Junction temperature, max	**175**	°C

RoHS Compliant
HALOGEN-FREE

Ordering information

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDY14N045RH	M2PAK-7P	14N045	Tape & Reel	Halogen Free

http://www.magnachip.com/powersolutions

MX LISTED NYSE

Maximum ratings, at T_J = 25°C, unless otherwise specified

Parameter		Symbol	Rating	Unit
Drain-source Voltage		V_{DS}	135	V
Gate-source Voltage		V_{GS}	± 20	V
[1] Drain current	Tc=25°C Silicon Limited	I_D	228	A
	Tc=100°C Silicon Limited		161	A
Pulsed drain current	Tc=25°C	I_{DM}	912	V
Total power dissipation	Tc=25°C	P_{tot}	469	W
	Tc=100°C		234	W
[3] Avalanche energy, single pulse		E_{AS}	761	mJ
Operating and storage temperature		T_j, T_{stg}	- 55 ~ 175	°C

Thermal characteristics

Parameter	Symbol	Rating	Unit
[1] Thermal resistance, junction - case	$R_{\theta JC}$	0.32	°C/W
Thermal resistance, junction - ambient	$R_{\theta JA}$	30	°C/W

Notes

1. Surface mounted FR-4 board by JEDEC (jesd51-7)
2. Pulse width limited by Tjmax
3. EAS is tested at starting Tj = 25℃, L = 1.0mH, I_{AS} = 39A, V_{DD} = 50V, V_{GS} = 10V

Electrical Characteristics (T_J = 25°C)

Static characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	$V_{(BR)DSS}$	135	-	-	V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	2.5	-	3.9	V	V_{DS}=V_{GS}, I_D=250 μA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=135 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	$R_{DS(on)}$	-	3.8	4.5	mΩ	V_{GS}=10 V, I_D=100 A
Gate resistance	R_G	-	3.0	-	Ω	f=1MHz
Transconductance	g_{fs}	-	120	-	S	V_{DS}=10 V, I_D=100 A

Dynamic characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C_{iss}	-	11635	-	pF	V_{GS}=0 V, V_{DS}=70 V, f=1 MHz
Output capacitance	C_{oss}	-	950	-	pF	V_{GS}=0 V, V_{DS}=70 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	12	-	pF	V_{GS}=0 V, V_{DS}=70 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	43	-	ns	V_{DD}=70 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω
Rise time	t_r	-	21	-	ns	V_{DD}=70 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω
Turn-off delay time	$t_{d(off)}$	-	102	-	ns	V_{DD}=70 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω
Fall time	t_f	-	18	-	ns	V_{DD}=70 V, V_{GS}=10 V, ID=100 A, $R_{G,ext}$=3Ω

Gate charge characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	55	-	nC	V_{DD}=70 V, I_D=100 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{gs(th)}$	-	46	-	nC	V_{DD}=70 V, I_D=100 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	31	-	nC	V_{DD}=70 V, I_D=100 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	40	-	nC	V_{DD}=70 V, I_D=100 A, V_{GS}=0 to 10 V
Gate charge total	Q_g	-	154	-	nC	V_{DD}=70 V, I_D=100 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	4.8	-	V	V_{DD}=70 V, I_D=100 A, V_{GS}=0 to 10 V

Source-drain diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Diode continous forward current	I_S	-	-	228	A	-
Diode pulse current	$I_{S,pulse}$	-	-	912	A	pulsed; tp ≤ 10 μs
Diode forward voltage	V_{SD}	-	1.0	1.2	V	V_{GS}=0 V, I_F=100 A
Reverse recovery time	t_{rr}	-	128	-	ns	I_F=100 A, d_{iF}/dt=100 A/μs
Reverse recovery charge	Q_{rr}	-	560	-	nC	I_F=100 A, d_{iF}/dt=100 A/μs

Electrical characteristics diagrams

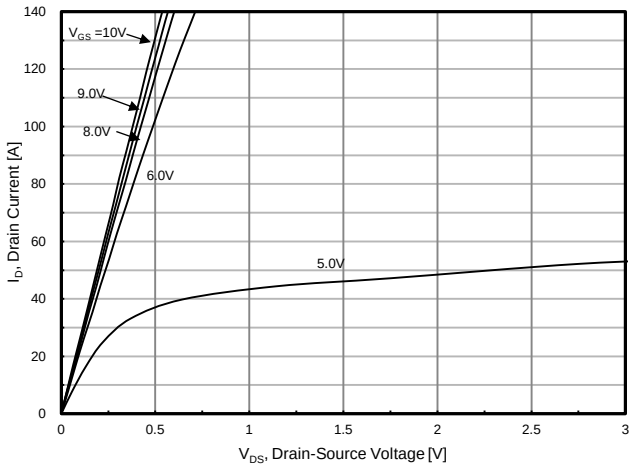


Fig. 1. On-Region Characteristics

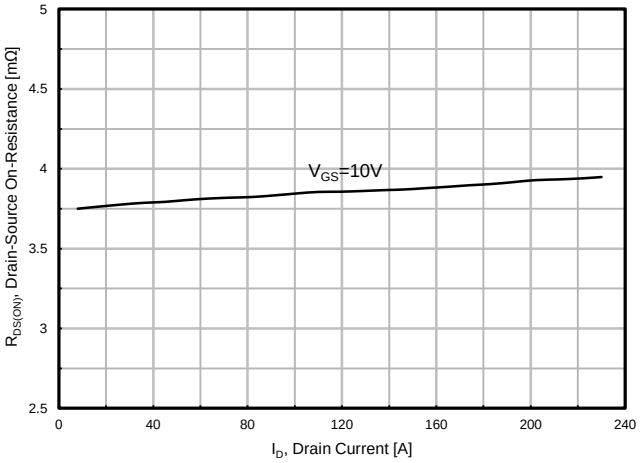


Fig. 2. On-Resistance vs. Drain Current and Gate Voltage

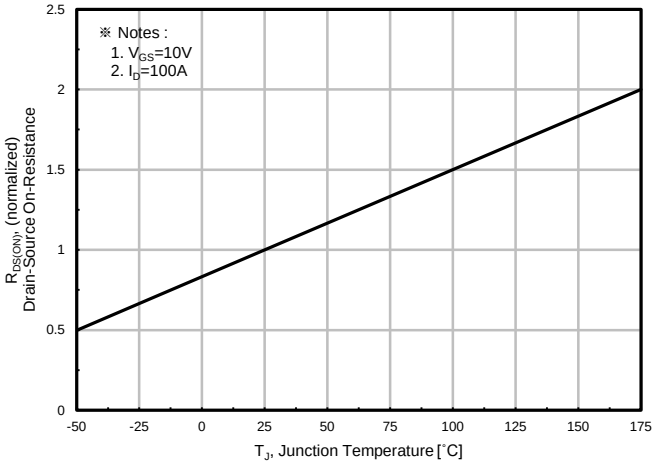


Fig. 3. On-Resistance vs. Junction Temperature

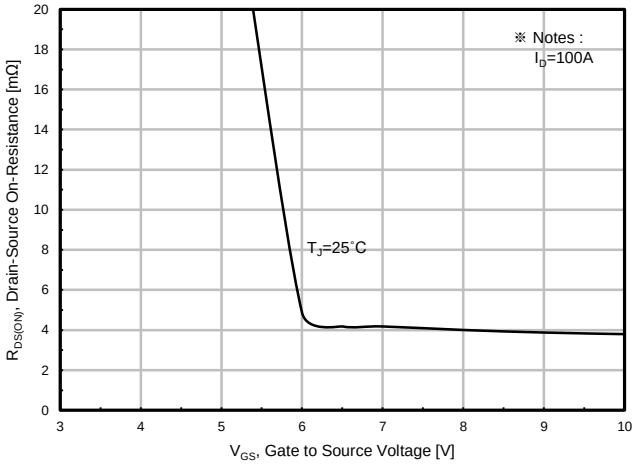


Fig. 4. On-Resistance vs. Gate to Source Voltage

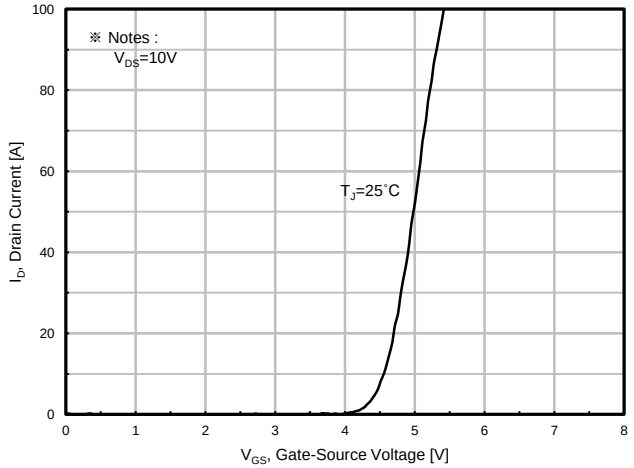


Fig. 5. Transfer Characteristics

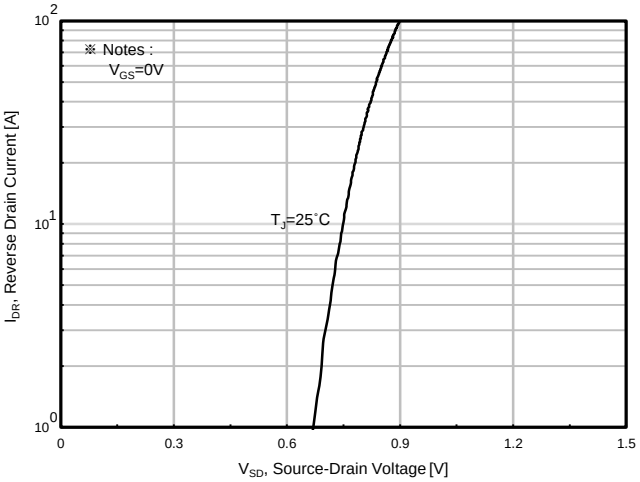


Fig. 6. Source-Drain Diode Forward Voltage

Electrical characteristics diagrams

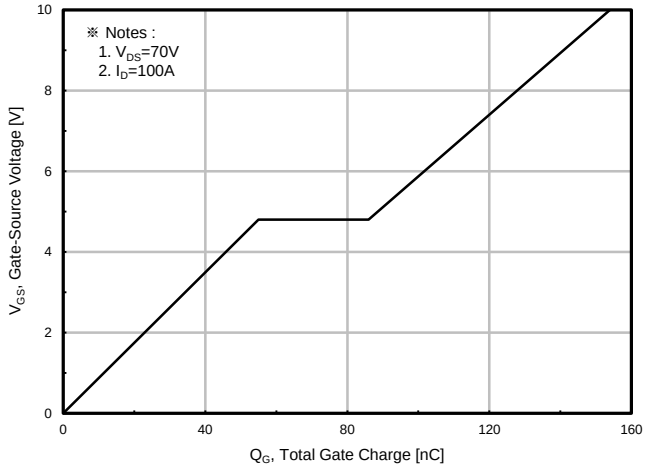


Fig. 7. Gate Charge

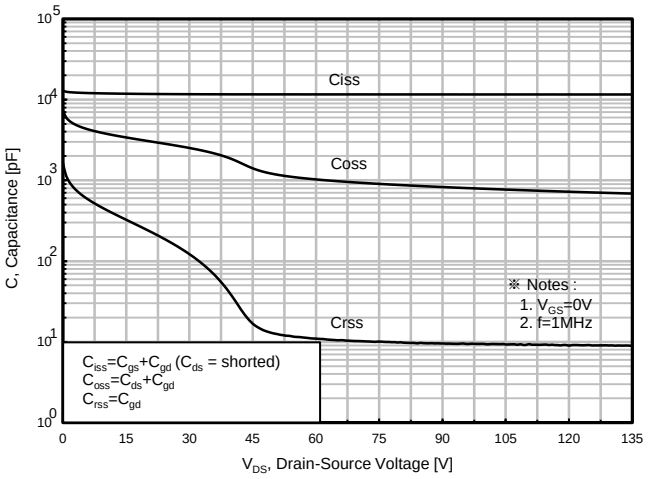


Fig. 8. Capacitance

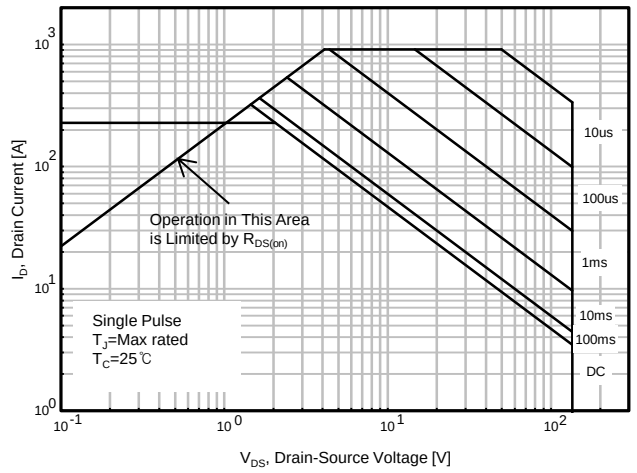


Fig. 9. Safe Operating Area, Junction-to-Ambient

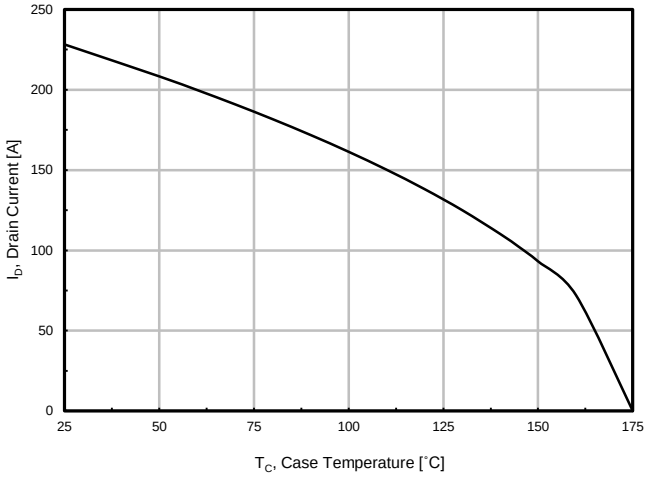


Fig. 10. Maximum Drain vs. Case Temperature

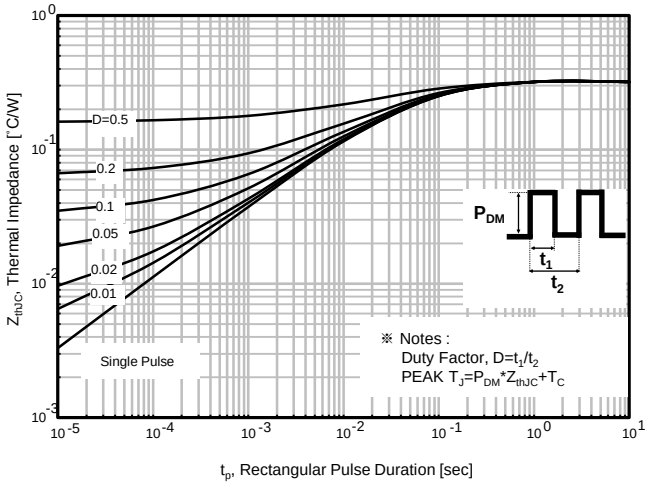
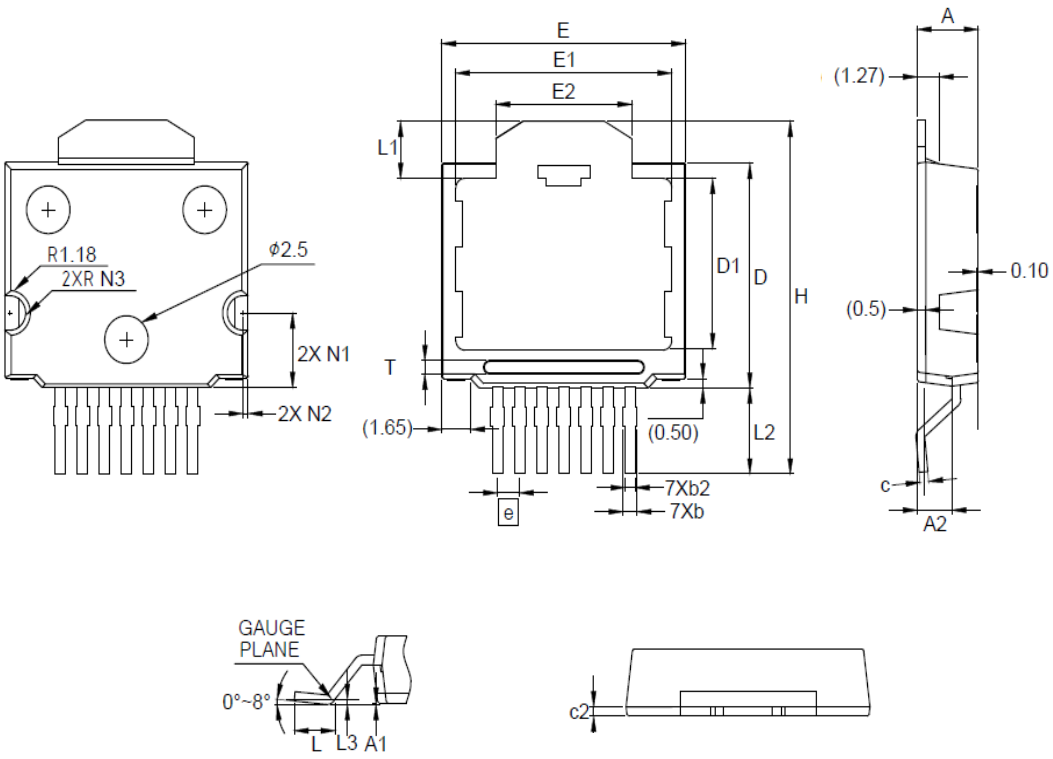


Fig. 11. Thermal Transient Impedance, Junction-to-Ambient

Package information

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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