

MDP14N050TH

Single N-channel Trench MOSFET 135V, 120A, 5.0mΩ

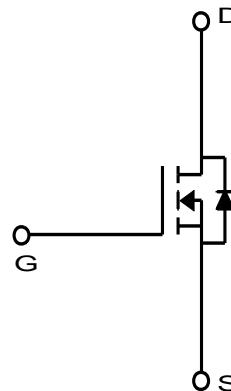
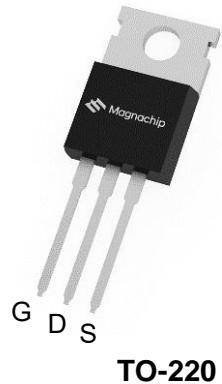
General Description

The MDP14N050TH, Magnachip's latest generation of MV MOSFET Technology, which provides high performance in the lowest R_{d(on)}, fast switching performance, and excellent quality.

These devices can also be utilized in industrial applications such as Low Power Drives of E-bike, Light electric vehicles, DC/DC converter, and general purpose applications

Features

- V_{DS} = 135V
- I_D = 120A @ V_{GS} = 10V
- Very low on-resistance R_{DS(ON)} < 5.0 mΩ @ V_{GS} = 10V
- 175 °C operating temperature
- 100% UIL Tested
- 100% R_g Tested
- 100% △V_{DS} Tested



Absolute Maximum Ratings (T_J = 25 °C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V _{DSS}	135	V
Gate-Source Voltage		V _{GSS}	±20	V
Continuous Drain Current ⁽¹⁾	T _C =25°C (Silicon Limited)	I _D	193	A
	T _C =100°C (Silicon Limited)		136	
	T _C =25°C (Package Limited)		120	
Pulsed Drain Current ⁽²⁾		I _{DM}	480	
Power Dissipation	T _C =25°C	P _D	375	W
	T _C =100°C		187	
Single Pulse Avalanche Energy ⁽³⁾		E _{AS}	450	mJ
Junction and Storage Temperature Range		T _J , T _{stg}	-55~175	°C

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient ⁽¹⁾	R _{θJA}	62.5	°C/W
Thermal Resistance, Junction-to-Case	R _{θJC}	0.4	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDP14N050TH	-55~175°C	TO-220	Tube	Halogen Free

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

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu\text{A}, V_{\text{GS}} = 0\text{V}$	135	-	-	V
Gate Threshold Voltage	$V_{\text{GS(th)}}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = 250\mu\text{A}$	2.5	-	3.9	
Drain Cut-Off Current	I_{DSS}	$V_{\text{DS}} = 135\text{V}, V_{\text{GS}} = 0\text{V}$	-	-	1.0	μA
Gate Leakage Current	I_{GSS}	$V_{\text{GS}} = \pm 20\text{V}, V_{\text{DS}} = 0\text{V}$	-	-	± 0.1	
Drain-Source ON Resistance	$R_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{V}, I_D = 50\text{A}$	-	4.2	5.0	$\text{m}\Omega$
Forward Transconductance	g_{fs}	$V_{\text{DS}} = 10\text{V}, I_D = 50\text{A}$	-	122	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	$V_{\text{DS}} = 70\text{V}, I_D = 50\text{A}, V_{\text{GS}} = 10\text{V}$	-	123	-	nC
Gate-Source Charge	Q_{gs}		-	41	-	
Gate-Drain Charge	Q_{gd}		-	22	-	
Input Capacitance	C_{iss}	$V_{\text{DS}} = 70\text{V}, V_{\text{GS}} = 0\text{V}, f = 1.0\text{MHz}$	-	9,267	-	pF
Reverse Transfer Capacitance	C_{rss}		-	27	-	
Output Capacitance	C_{oss}		-	923	-	
Turn-On Delay Time	$t_{\text{d(on)}}$	$V_{\text{GS}} = 10\text{V}, V_{\text{DS}} = 70\text{V}, I_D = 50\text{A}, R_G = 3.0\Omega$	-	36	-	ns
Rise Time	t_r		-	21	-	
Turn-Off Delay Time	$t_{\text{d(off)}}$		-	83	-	
Fall Time	t_f		-	13	-	
Gate Resistance	R_g	$f=1\text{ MHz}$	-	3	-	Ω
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	$I_S = 50\text{A}, V_{\text{GS}} = 0\text{V}$	-	0.9	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 50\text{A}, dI/dt = 125\text{A}/\mu\text{s}$	-	117	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	538	-	nC

Note :

1. Surface mounted FR-4 board by JEDEC (jesd51-7)
2. Pulse width limited by $T_{J\max}$
3. E_{AS} is tested at starting $T_J = 25^\circ\text{C}$, $L = 1.0\text{mH}$, $I_{AS} = 30\text{A}$, $V_{\text{GS}} = 10\text{V}$

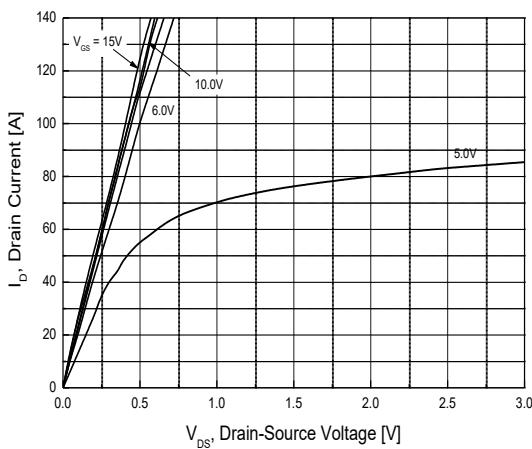


Fig.1 On-Region Characteristics

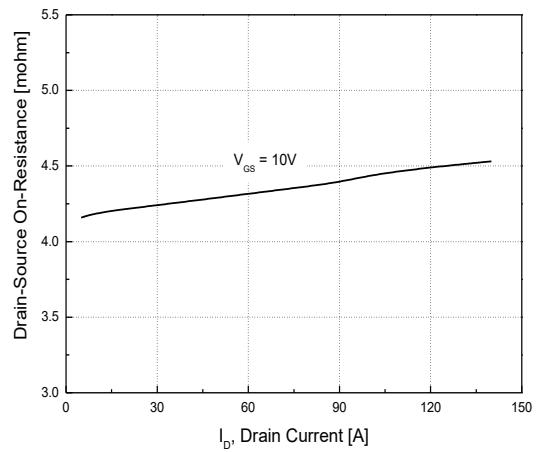


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

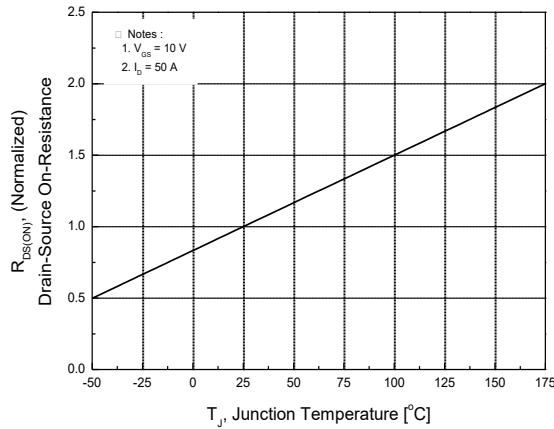


Fig.3 On-Resistance Variation with Temperature

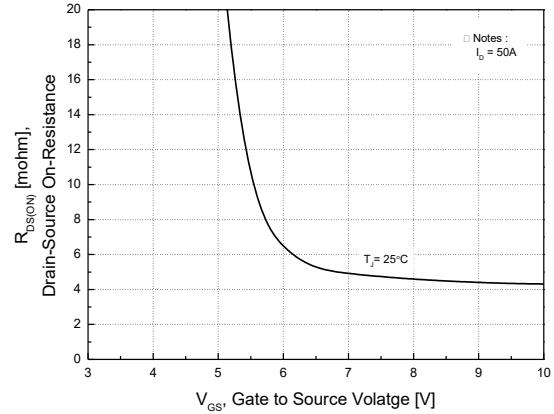


Fig.4 On-Resistance Variation with Gate to Source Voltage

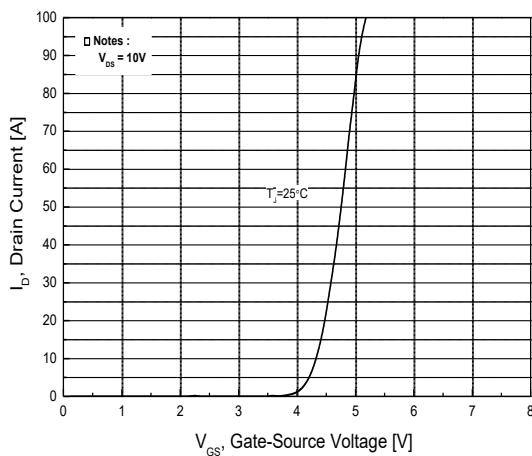


Fig.5 Transfer Characteristics

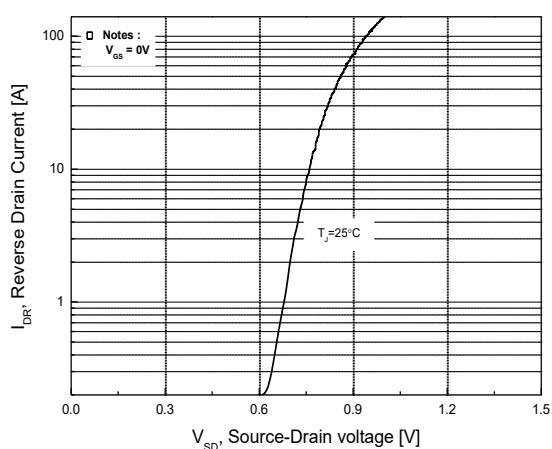


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

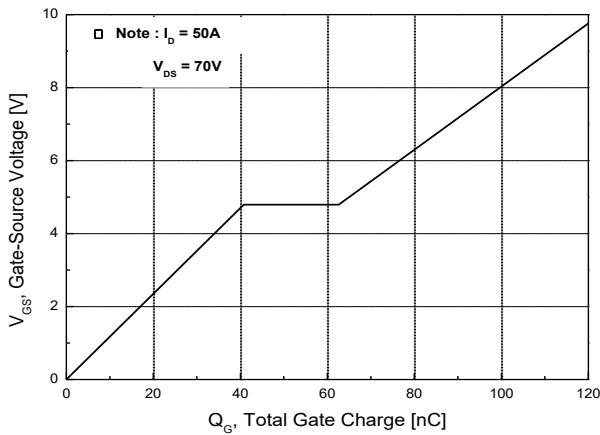


Fig.7 Gate Charge Characteristics

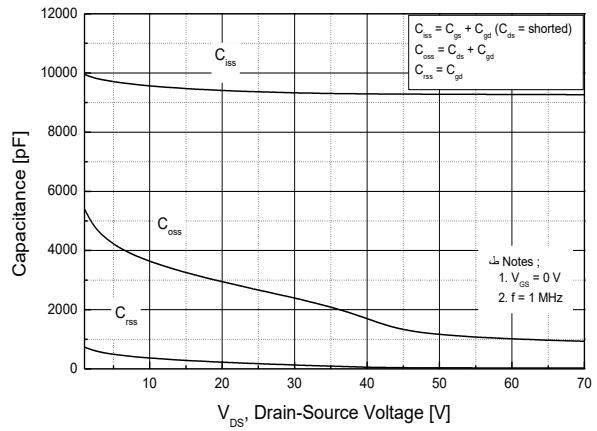


Fig.8 Capacitance Characteristics

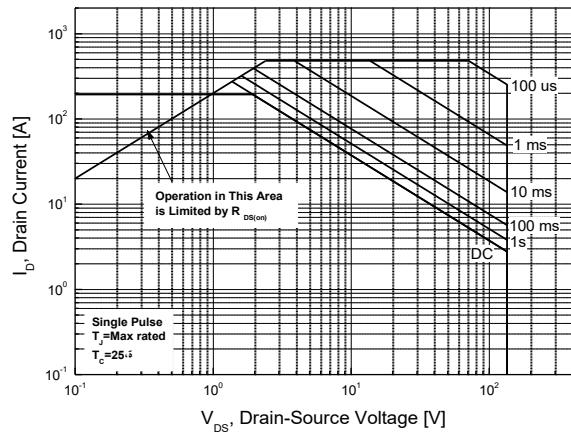


Fig.9 Maximum Safe Operating Area

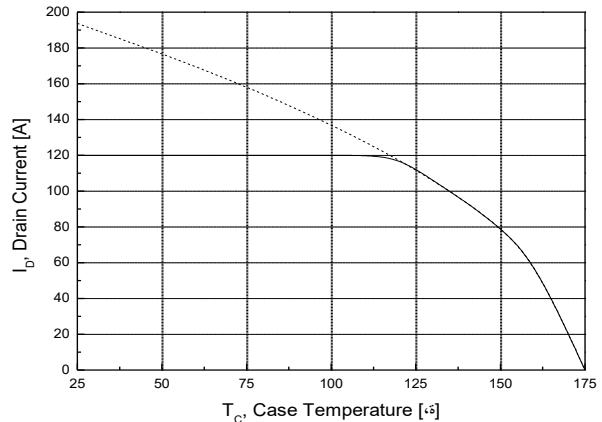


Fig.10 Maximum Drain Current vs. Case Temperature

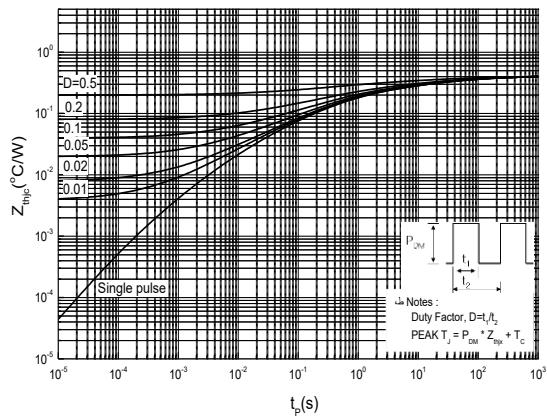
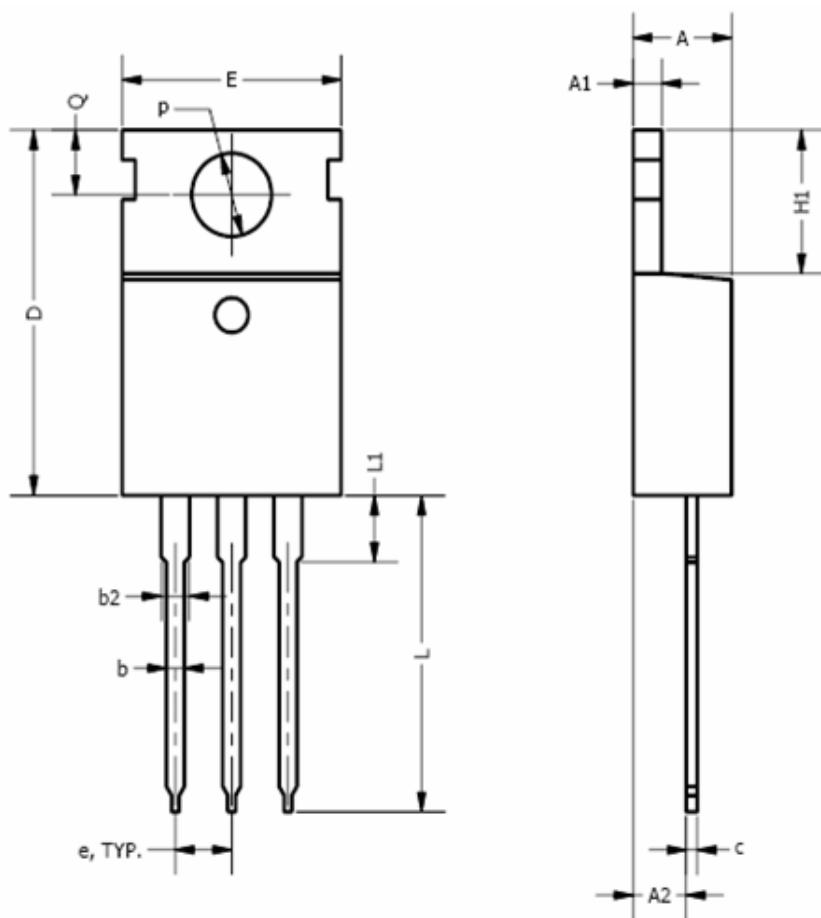


Fig.11 Transient Thermal Response Curve

Package Dimension

TO-220

Dimensions are in millimeters unless otherwise specified



Symbol	Min	Nom	Max
A	3.56		4.83
A1	0.50		1.40
A2	2.03		2.92
b	0.38	0.69	1.02
b2	1.14	1.45	1.78
c	0.36		0.61
D	14.22		16.51
e	2.54 TYP		
E	9.65		10.67
H1	5.84		6.86
L	12.70		14.73
L1			6.35
φP	3.53		4.09
Q	2.54		3.43

Note : 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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