

General Description

The MDP13N50 uses advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

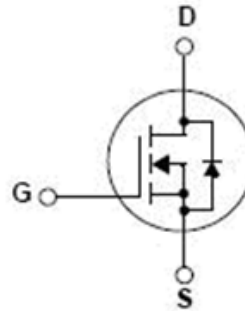
MDP13N50 is suitable device for SMPS, HID and general purpose applications.

Features

- $V_{DS} = 500V$
- $I_D = 13.0A$ @ $V_{GS} = 10V$
- $R_{DS(ON)} < 0.5\Omega$ @ $V_{GS} = 10V$

Applications

- Power Supply
- HID
- Lighting



Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	500	V
Drain-Source Voltage @ T_{jmax}		$V_{DSS} @ T_{jmax}$	550	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	$T_C=25^\circ C$	I_D	13	A
	$T_C=100^\circ C$		8.2	A
Pulsed Drain Current ⁽¹⁾		I_{DM}	52	A
Power Dissipation	$T_C=25^\circ C$	P_D	187	W
	Derate above 25 °C		1.49	W/°C
Peak Diode Recovery dv/dt ⁽³⁾		Dv/dt	4.5	V/ns
Single Pulse Avalanche Energy ⁽⁴⁾		E_{AS}	580	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	°C

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case ⁽¹⁾	$R_{\theta JC}$	0.67	

Ordering Information

Part Number	Marking	Temp. Range	Package	Packing	ROHS status
MDP13N50TH	MDP13N50	-55~150°C	TO-220	Tube	Halogen Free

Electrical Characteristics (Ta =25°C)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D = 250μA, V _{GS} = 0V	500	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.0	-	5.0	
Drain Cut-Off Current	I _{DSS}	V _{DS} = 500V, V _{GS} = 0V	-	-	1	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30V, V _{DS} = 0V	-	-	100	nA
Drain-Source ON Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 6.5A		0.39	0.5	Ω
Forward Transconductance	g _{fs}	V _{DS} = 40V, I _D = 6.5A	-	13	-	S
Dynamic Characteristics						
Total Gate Charge	Q _g	V _{DS} = 400V, I _D = 13A, V _{GS} = 10V ⁽³⁾	-	33		nC
Gate-Source Charge	Q _{gs}		-	10.4		
Gate-Drain Charge	Q _{gd}		-	13		
Input Capacitance	C _{iss}	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	-	1390		pF
Reverse Transfer Capacitance	C _{rss}		-	6.3		
Output Capacitance	C _{oss}		-	173		
Turn-On Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DS} = 250V, I _D = 13A, R _G = 25Ω ⁽³⁾	-	30.2		ns
Rise Time	t _r		-	52.8		
Turn-Off Delay Time	t _{d(off)}		-	60.8		
Fall Time	t _f		-	33.8		
Drain-Source Body Diode Characteristics						
Maximum Continuous Drain to Source Diode Forward Current	I _S		-	13	-	A
Source-Drain Diode Forward Voltage	V _{SD}	I _S = 13A, V _{GS} = 0V	-		1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 13A, di/dt = 100A/μs ⁽³⁾	-	325		ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	2.9		μC

Note :

- Pulse width is based on R_{θJC} & R_{θJA} and the maximum allowed junction temperature of 150°C.
- Pulse test: pulse width ≤300us, duty cycle≤2%, pulse width limited by junction temperature T_{J(MAX)}=150°C.
- I_{SD} ≤9.0A, di/dt≤200A/us, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
- L=6.2mH, I_{AS}=13.0A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C

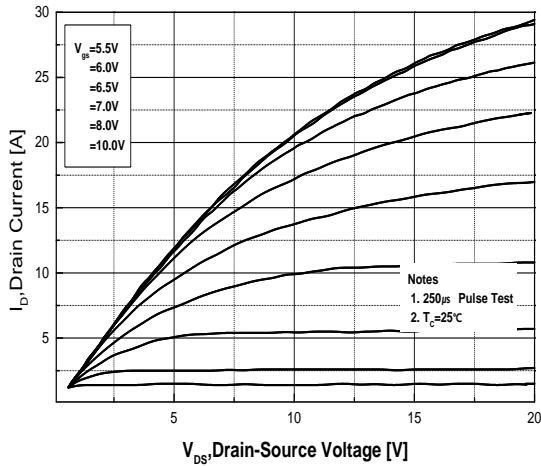


Fig.1 On-Region Characteristics

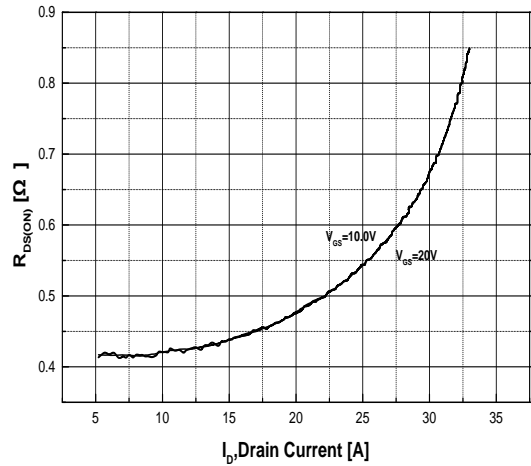


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

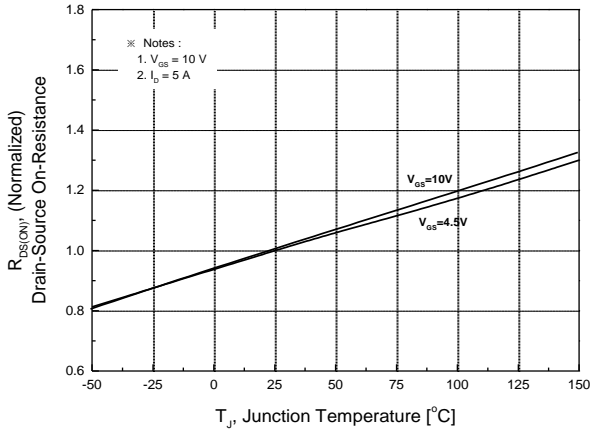


Fig.3 On-Resistance Variation with Temperature

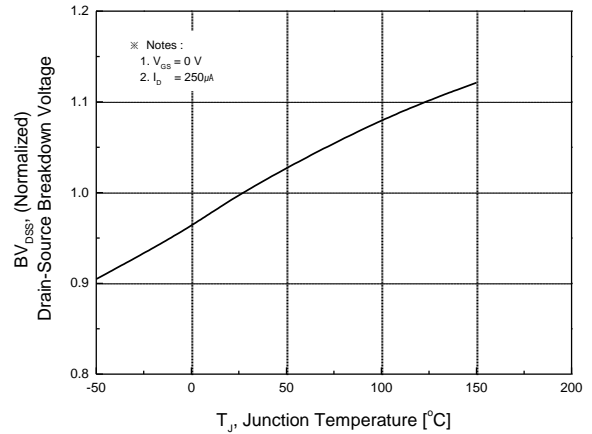


Fig.4 Breakdown Voltage Variation vs. Temperature

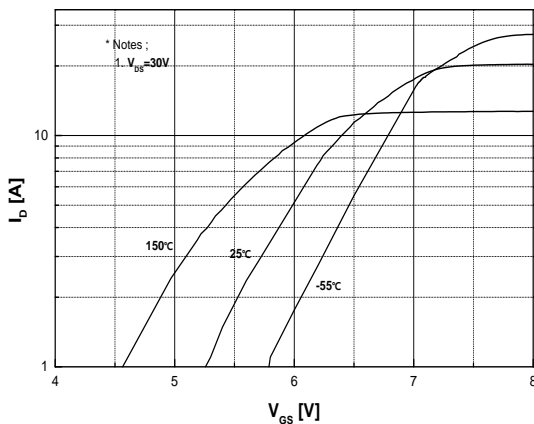


Fig.5 Transfer Characteristics

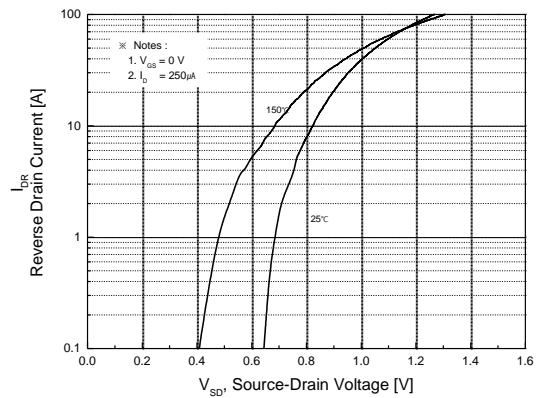


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

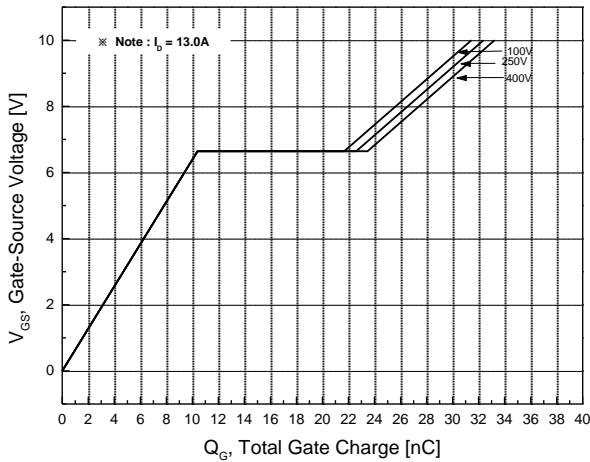


Fig.7 Gate Charge Characteristics

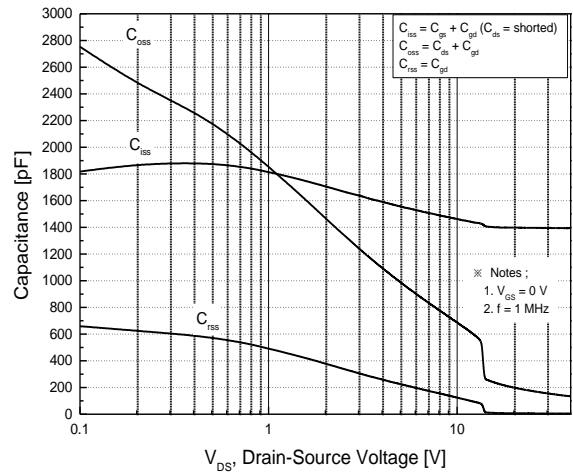


Fig.8 Capacitance Characteristics

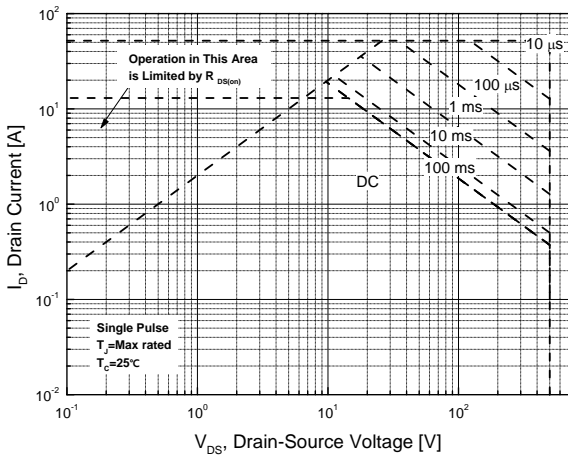


Fig.9 Maximum Safe Operating Area

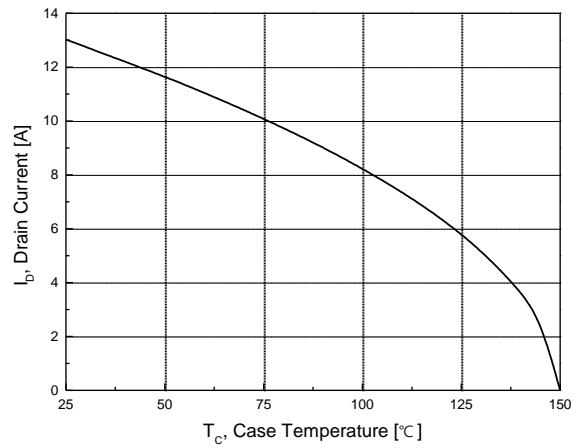


Fig.10 Maximum Drain Current vs. Case Temperature

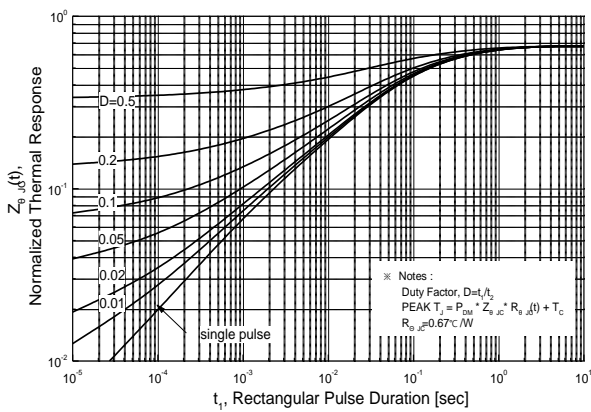


Fig.11 Transient Thermal Response Curve

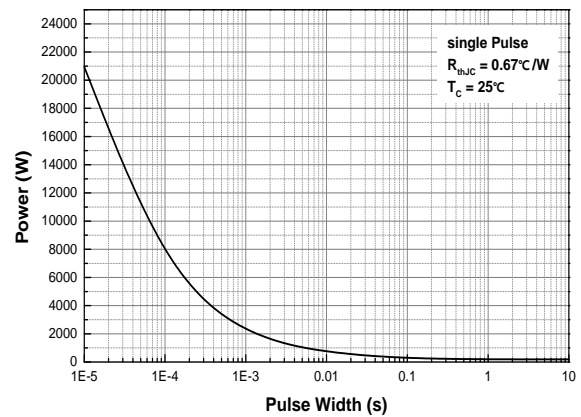
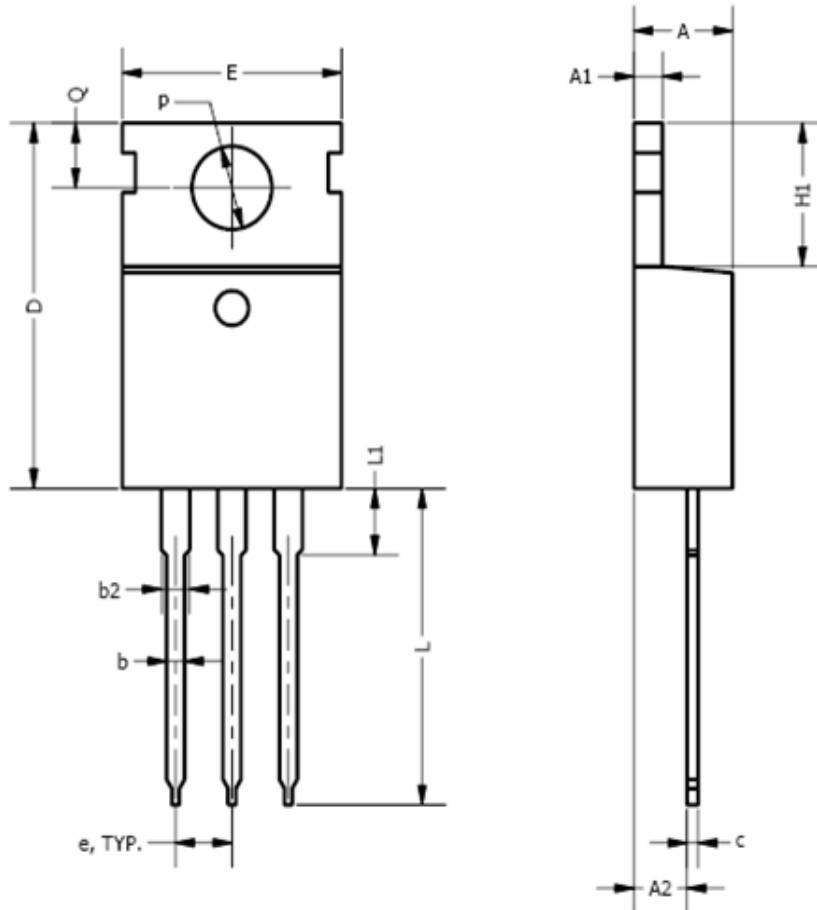


Fig.12 Single Pulse Maximum Power Dissipation

Physical 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

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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