

### General Description

The MDP18N50 uses advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

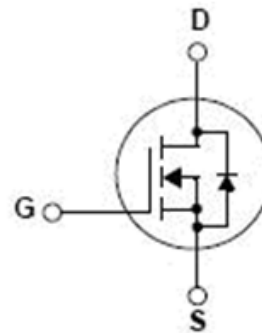
MDP18N50 is suitable device for SMPS, HID and general purpose applications.

### Features

- $V_{DS} = 500V$
- $I_D = 18.0A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} < 0.27\Omega$  @  $V_{GS} = 10V$

### Applications

- Power Supply
- HID
- Lighting



### Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DSS}$	500	V	
Gate-Source Voltage	$V_{GSS}$	±30	V	
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	18	A
		$T_C=100^\circ C$	11	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	72	72	
Power Dissipation	$P_D$	$T_C=25^\circ C$	236	W
		Derate above 25 °C	1.89	W/°C
Peak Diode Recovery $dv/dt$ <sup>(3)</sup>	$Dv/dt$	4.5	V/ns	
Single Pulse Avalanche Energy <sup>(4)</sup>	$E_{AS}$	950	mJ	
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~150	°C	

### Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient <sup>(1)</sup>	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case <sup>(1)</sup>	$R_{\theta JC}$	0.53	

**Ordering Information**

Part Number	Marking	Temp. Range	Package	Packing
MDP18N50TH	MDP18N50	-55~150°C	TO-220	Tube

**Electrical Characteristics (Ta =25°C)**

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	500	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	-	5.0	
Drain Cut-Off Current	$I_{DSS}$	$V_{DS} = 500V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 9A$		0.22	0.27	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 40V, I_D = 9A$	-	13	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 400V, I_D = 18A, V_{GS} = 10V^{(3)}$	-	48		nC
Gate-Source Charge	$Q_{gs}$		-	12		
Gate-Drain Charge	$Q_{gd}$		-	15		
Input Capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	2430		pF
Reverse Transfer Capacitance	$C_{rss}$		-	10		
Output Capacitance	$C_{oss}$		-	302		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 250V, I_D = 18A, R_G = 25\Omega^{(3)}$	-	58		ns
Rise Time	$t_r$		-	74		
Turn-Off Delay Time	$t_{d(off)}$		-	110		
Fall Time	$t_f$		-	44		
<b>Drain-Source Body Diode Characteristics</b>						
Maximum Continuous Drain to Source Diode Forward Current	$I_S$	$I_S = 18A, V_{GS} = 0V$	-	18	-	A
Source-Drain Diode Forward Voltage	$V_{SD}$		-		1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 18A, di/dt = 100A/\mu s^{(3)}$	-	375		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	4.2		$\mu C$

Note :

- Pulse width is based on  $R_{\theta JC}$  &  $R_{\theta JA}$  and the maximum allowed junction temperature of 150°C.
- Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ , pulse width limited by junction temperature  $T_J(MAX) = 150^\circ C$ .
- $I_{SD} \leq 9.0A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$
- $L = 5.3mH$ ,  $I_{AS} = 18.0A$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$

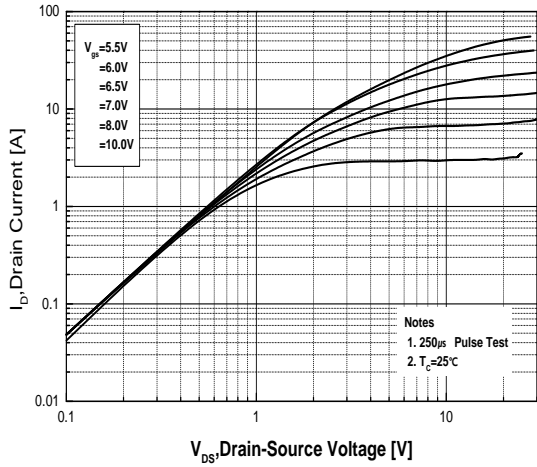


Fig.1 On-Region Characteristics

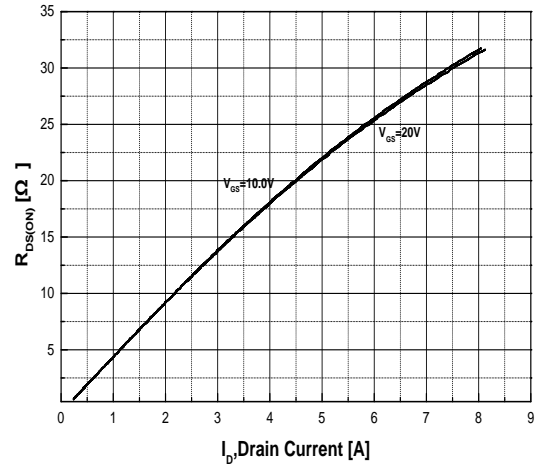


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

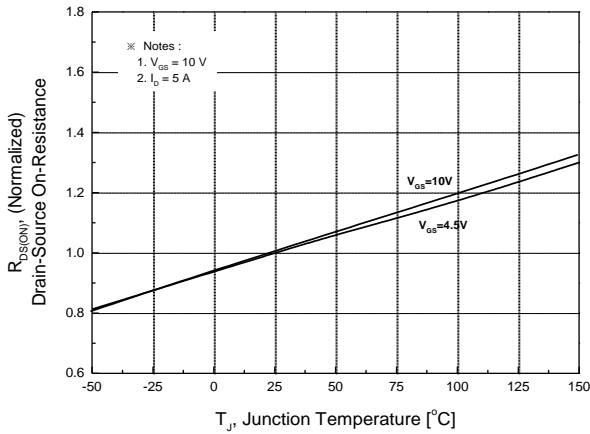


Fig.3 On-Resistance Variation with Temperature

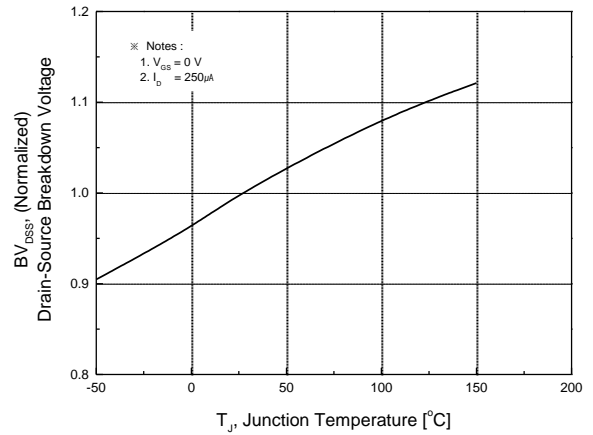


Fig.4 Breakdown Voltage Variation vs. Temperature

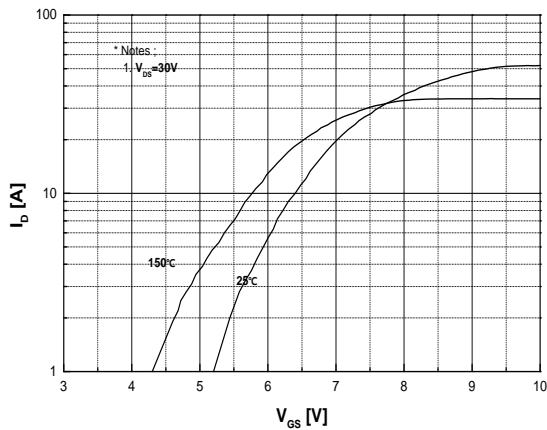


Fig.5 Transfer Characteristics

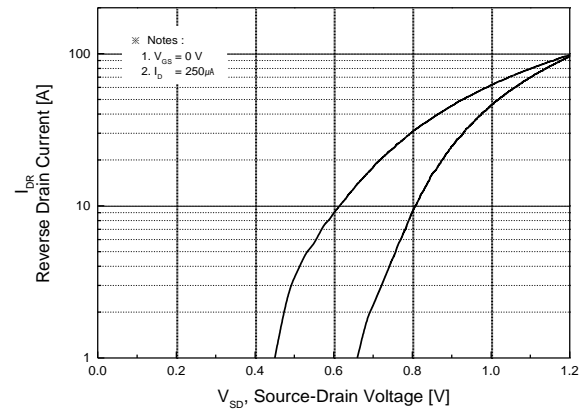
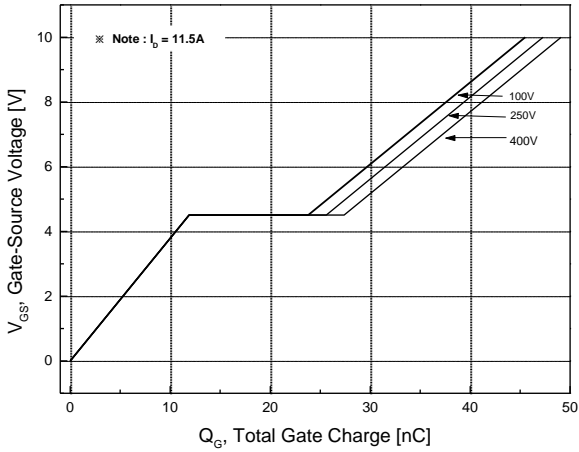
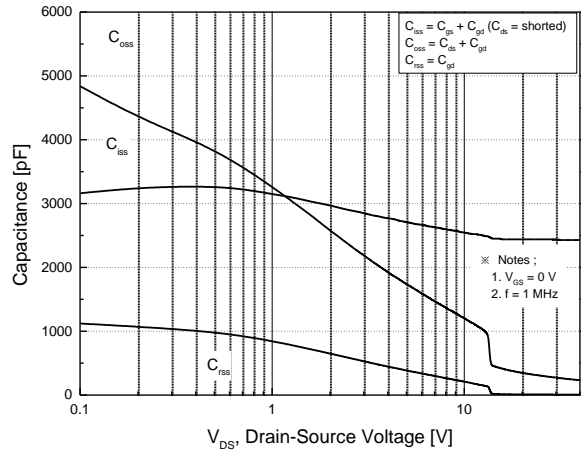


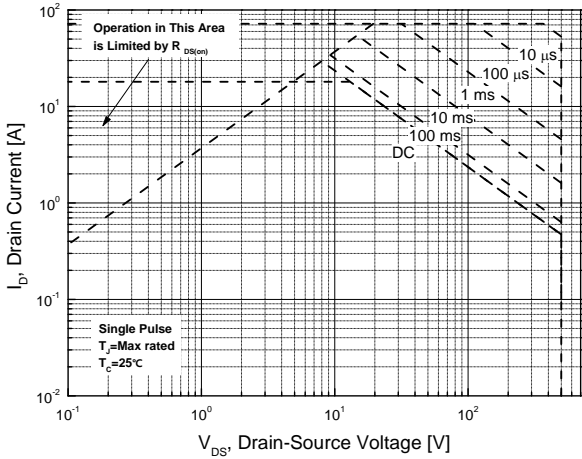
Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature



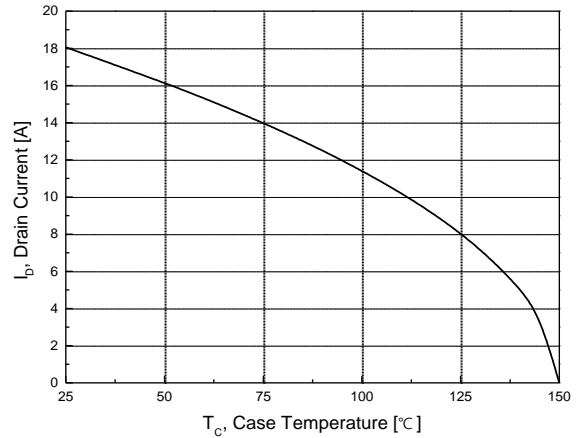
**Fig.7 Gate Charge Characteristics**



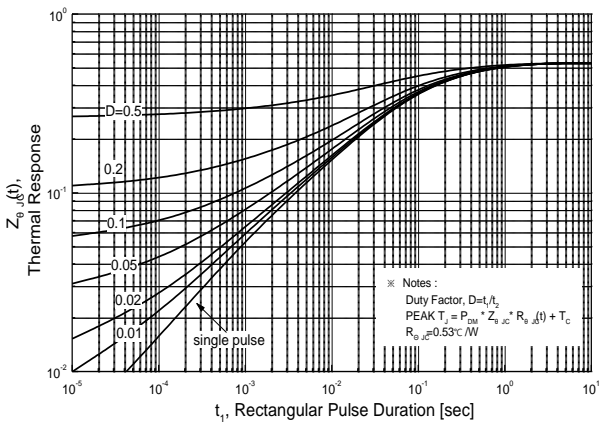
**Fig.8 Capacitance Characteristics**



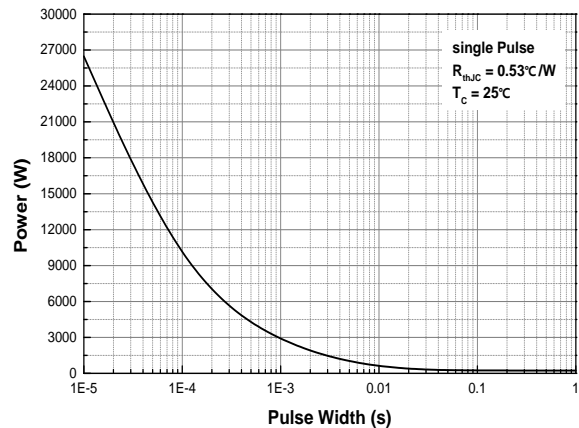
**Fig.9 Maximum Safe Operating Area**



**Fig.10 Maximum Drain Current vs. Case Temperature**



**Fig.11 Transient Thermal Response Curve**




**Fig.12 Single Pulse Maximum Power Dissipation**



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