

200V N-Channel MOSFET

Description

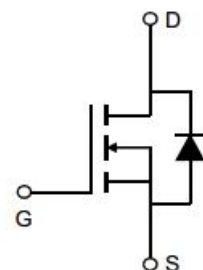
MP40N20, the silicon N-channel Enhanced MOSFETs, is obtained by advanced MOSFET technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor is suitable device for SMPS, high speed switching and general purpose applications

FEATURES

- ① Proprietary New Planar Technology
- ② $R_{DS(ON),typ.}=50m\ \Omega @V_{GS}=10V$
- ③ Low Gate Charge Minimize Switching Loss
- ④ Fast Recovery Body Diode

APPLICATIONS

- ① DC-DC Converters
- ② DC-AC Inverters for UPS
- ③ SMPS and Motor controls



Schematic diagram



TO-220

Package Marking And Ordering Information:

Ordering Codes	Package	Product Code	Packing
MP40N20	TO-220	MP40N20	Tube

Absolute Maximum Ratings $T_C = 25^{\circ}C$, unless otherwise noted			
Parameter	Symbol	Value	Unit
		TO-220	
Drain-Source Voltage	V_{DSS}	200	V
Continuous Drain Current	I_D	40	A
Pulsed Drain Current (note1)	I_{DM}	160	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note1)	E_{AS}	191	mJ
Avalanche Current (note1)	I_{AS}	31	A
Repetitive Avalanche Energy (note1)	E_{AR}	124	mJ



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MP40N20

Power Dissipation (TC = 25°C)	P _D	63.7	104			W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55~+150				°C
Thermal Resistance						
Parameter	Symbol	Value				Unit
		TO-220				
Thermal Resistance, Junction-to-Case	R _{thJC}	1.2				°C/W
Thermal Resistance, Junction-to-Ambient	R _{thJA}	60				
Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	200	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =200V, V _{GS} = 0V, T _J = 25 °C	--	--	1	μA
		V _{DS} =200V, V _{GS} =0V, T _J = 125 °C	--	--	100	
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	R _{DS(on)}	V _{GS} = 10V, I _D = 20A	--	0.05	0.06	Ω
Forward Transconductance (Note4)	g _{fs}	V _{DS} = 25V, I _D = 20A	--	16	--	S
Dynamic						
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz	--	2800	--	pF
Output Capacitance	C _{oss}		--	355	--	
Reverse Transfer Capacitance	C _{rss}		--	101	--	
Total Gate Charge	Q _g	V _{DD} = 160V, I _D = 40A,	--	154		nC
Gate-Source Charge	Q _{gs}		--	13	--	
Gate-Drain Charge	Q _{gd}		--	58	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =160V, I _D =40A, V _{GS} =15V.R _G =25Ω	--	46	--	ns
Turn-on Rise Time	t _r		--	54	--	
Turn-off Delay Time	t _{d(off)}		--	360	--	
Turn-off Fall Time	t _f		--	96	--	
Drain-Source Body Diode Characteristics						

Continuous Source Current	I_{SD}	Integral PN-diode in MOSFET	--	--	40	A
Pulsed Source Current	I_{SM}		--	--	160	
Body Forward Voltage	V_{SD}	$I_S = 20A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_F = 10A,$ $di_F/dt = 100A/\mu s$	--	152	--	ns
Reverse Recovery Charge	Q_{rr}		--	1	--	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=1mH, V_{DD}=30V, R_G=25\Omega$, Starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Characteristics TJ = 25°C, unless otherwise noted

Figure 1 Safe Operating Area

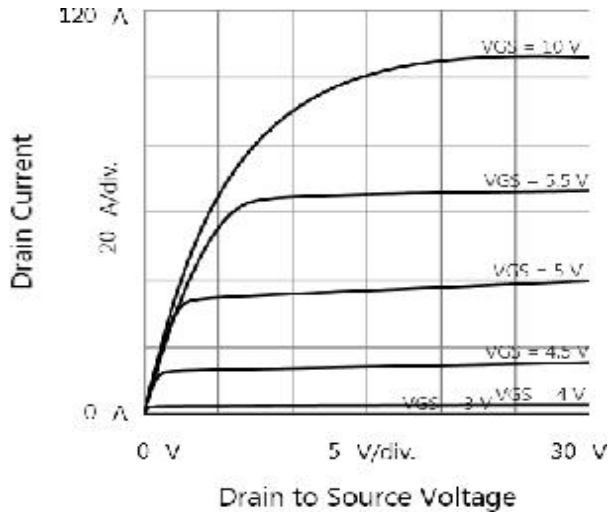


Figure 2 Max Thermal Impedance

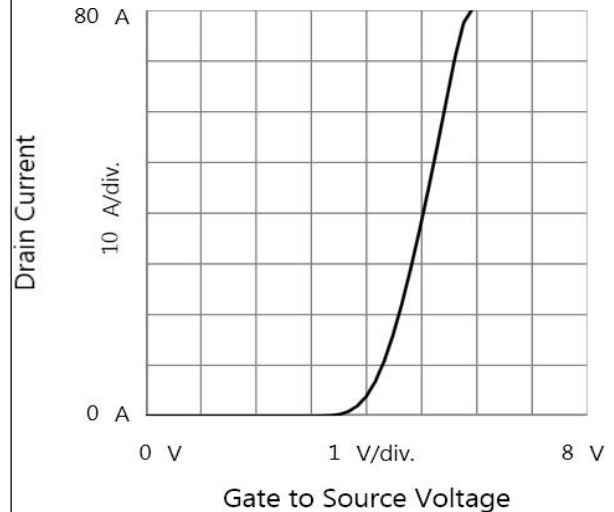


Figure 3. Drain to Source Resistance vs. Drain Current

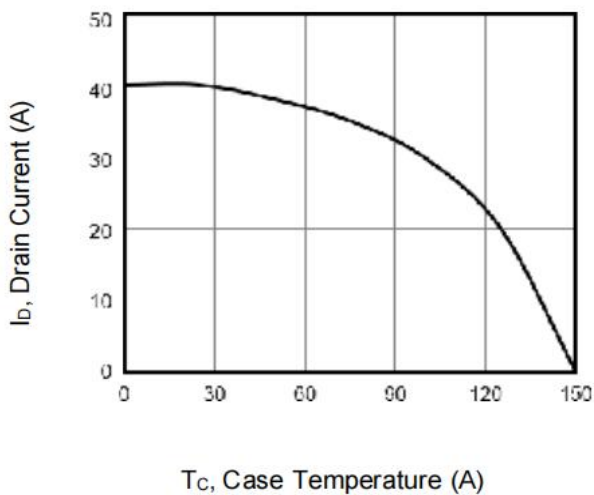


Figure 4. BVDSS Variation vs. Temperature

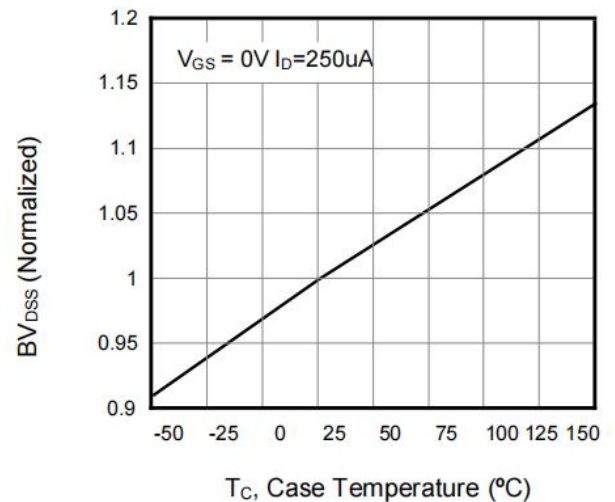


Figure 5. Drain to Source Voltage vs. Gate to Source Voltage

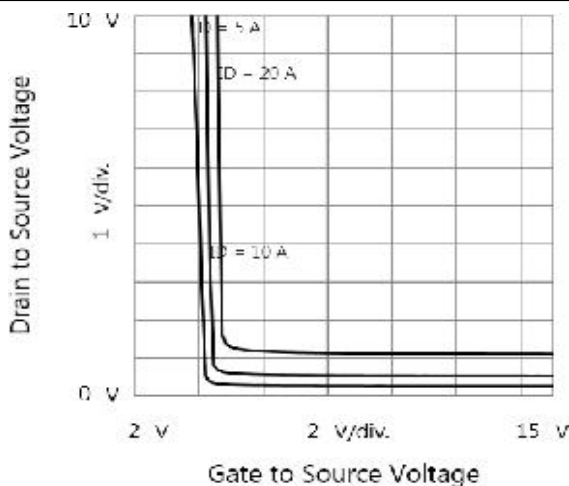
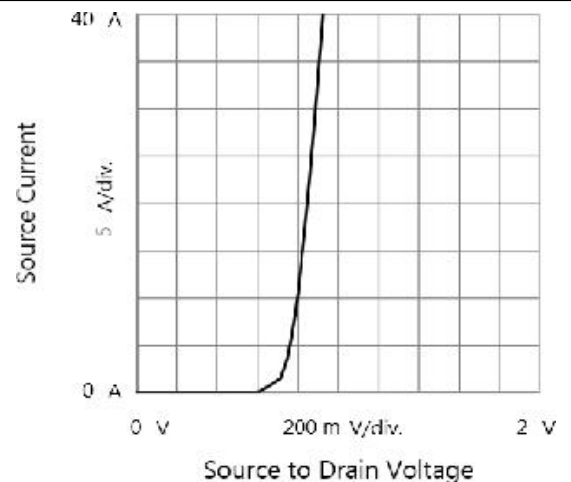


Figure 6. Body Diode Forward Characteristics



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Capacitance

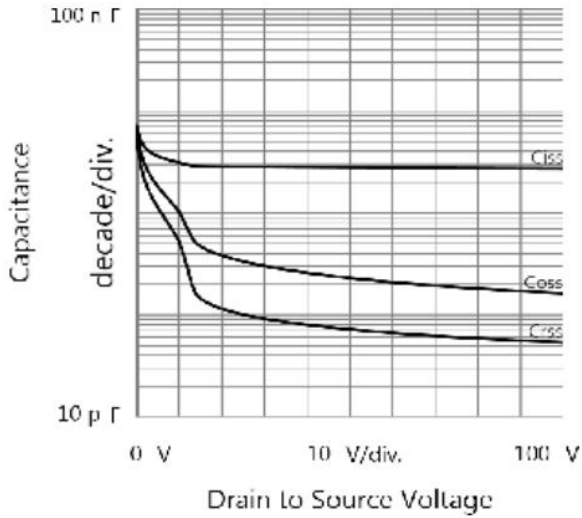


Figure 8. Gate Charge

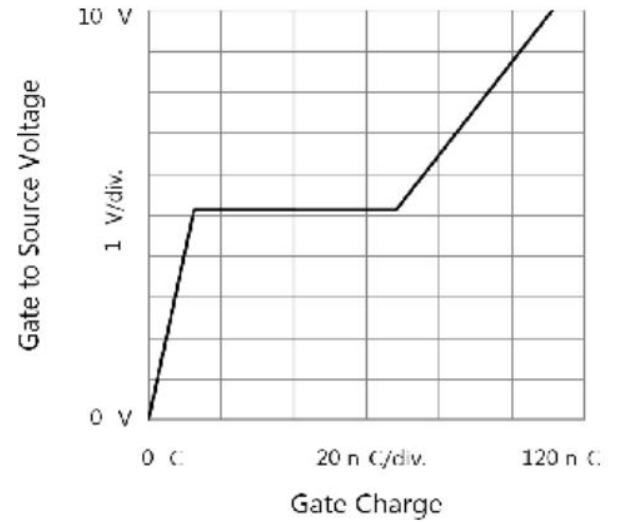


Figure 9. Transient Thermal Impedance (TO-220F)

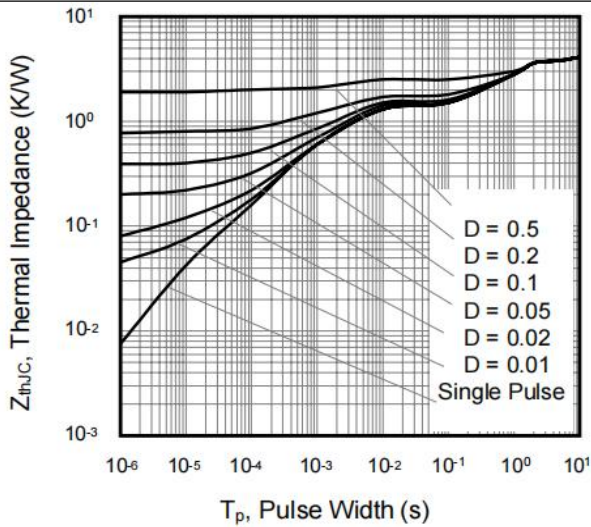


Figure 10. Transient Thermal Impedance (TO-220)

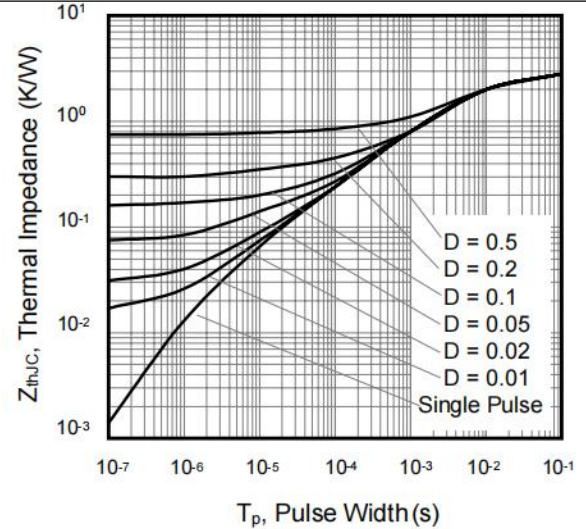


Figure A: Gate Charge Test Circuit and Waveform

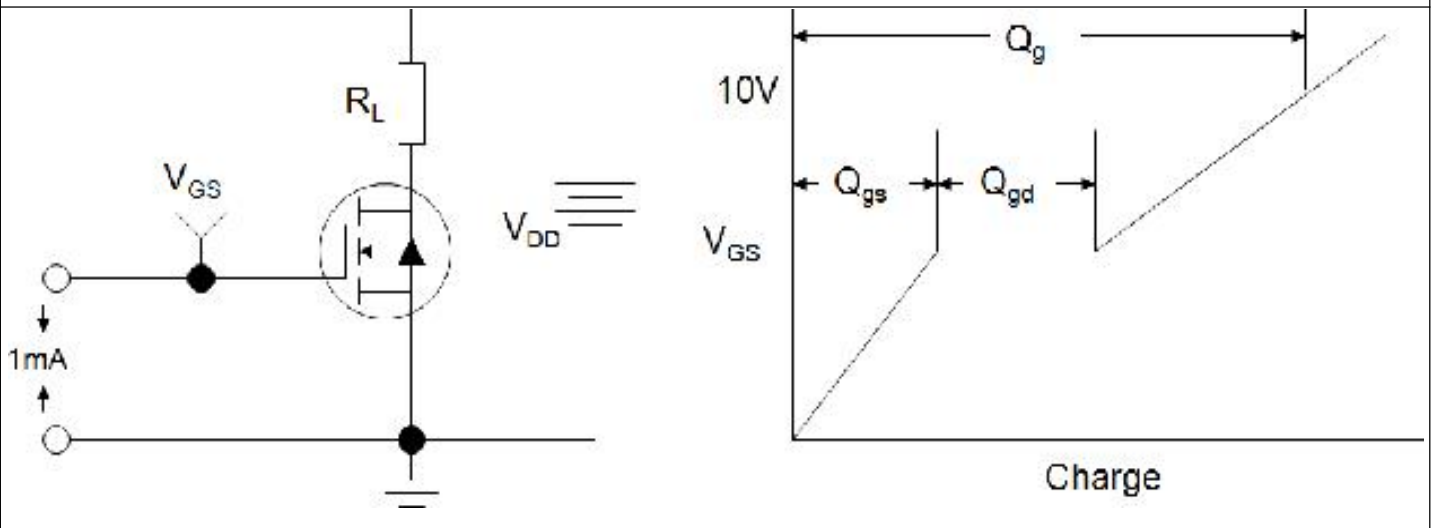


Figure B: Resistive Switching Test Circuit and Waveform

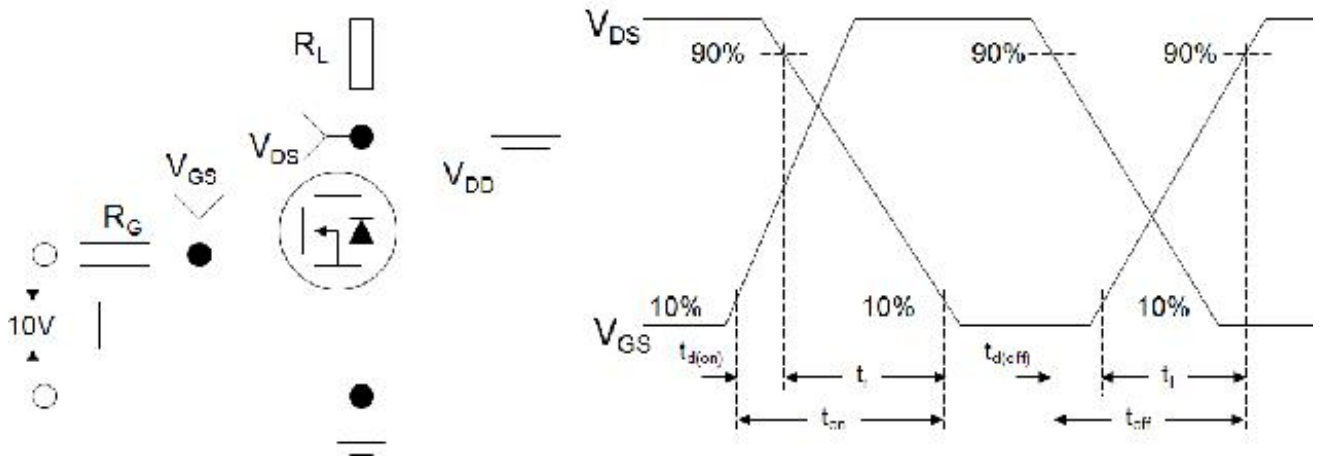
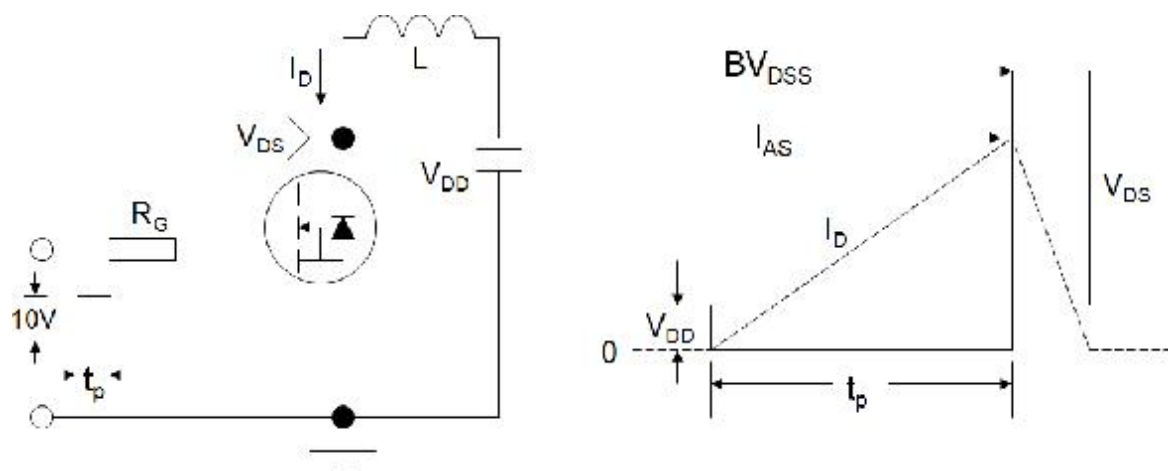
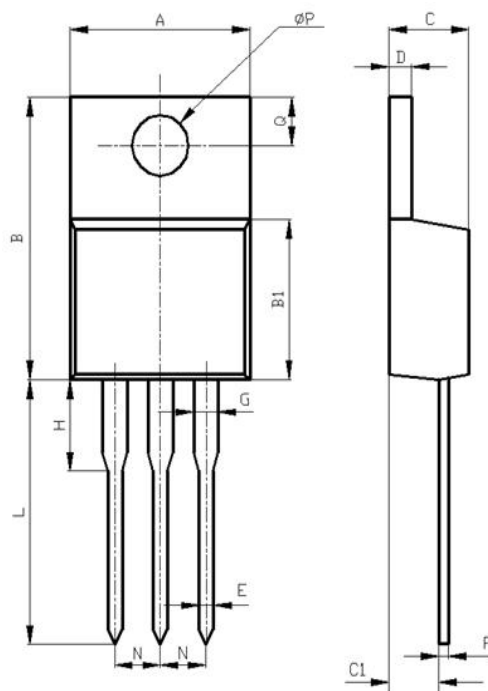


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Package Description



Items	Values(mm)	
	MIN	MAX
A	9.60	10.6
B	15.0	16.0
B1	8.90	9.50
C	4.30	4.80
C1	2.30	3.10
D	1.20	1.40
E	0.70	0.90
F	0.30	0.60
G	1.17	1.37
H	2.70	3.80
L	12.6	14.8
N	2.34	2.74
Q	2.40	3.00
Ø P	3.50	3.90

TO-220 Package



NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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