

Silicon N-Channel Power MOSFET
Description

The MPG250N04P uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- ① $V_{DS}=40V, I_D=250A$ $R_{DS(ON)} < 2.5m\Omega$ @ $V_{GS}=10V$ (Typ=1.8m Ω)
- ② High density cell design for ultra low $R_{DS(ON)}$
- ③ Fully characterized avalanche voltage and current
- ④ Excellent package for good heat dissipation

Applications

- ① Power switching application
- ② Hard switched and high frequency circuits
- ③ Uninterruptible power supply

Package Marking And Ordering Information

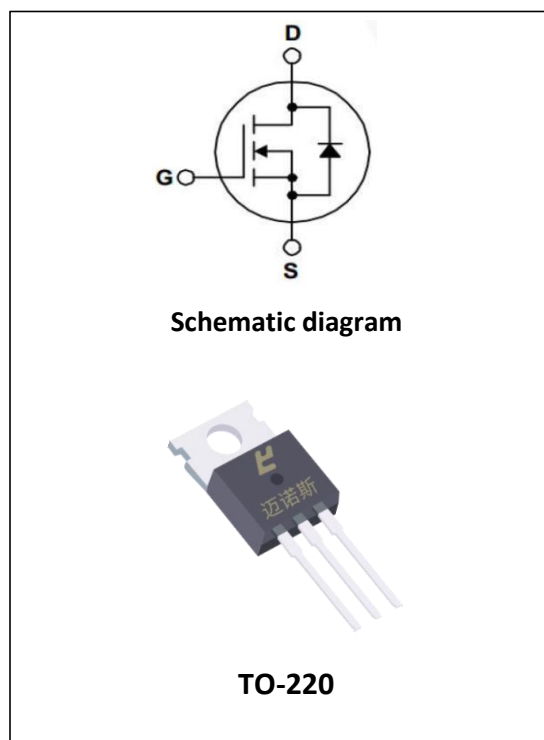
Ordering Codes	Package	Product Code	Packing
MPG250N04-P	TO-220	MPG250N04P	Tube

ABSOLUTE RATINGS (at $T_C=25^\circ C$ unless otherwise specified)

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	40	V
I_D	Continuous Drain Current	250	A
I_{DM}	Pulsed Drain Current	1000	A
V_{GS}	Gate-to-Source Voltage	± 20	V
P_D	Power Dissipation	242	W
E_{AS}	Single pulse avalanche energy	1300	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range	175, -55 to 175	$^\circ C$

Thermal characteristics

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case θ_2	0.62	$^\circ C/W$



Electrical Characteristics (at $T_C=25^{\circ}\text{C}$ unless otherwise specified)

OFF Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=32V, V_{GS}=0V, T_a=25^{\circ}\text{C}$	--	--	1.0	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+20V$	--	--	0.1	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-20V$	--	--	-0.1	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=80A$	--	1.8	2.5	m Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=20V, f=1.0\text{MHz}$	--	7500	--	pF
C_{oss}	Output Capacitance		--	1950	--	
C_{rss}	Reverse Transfer Capacitance		--	120	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, I_D=85A$ $V_{GS}=10V, R_G=1.6\Omega, R_L=0.5\Omega$	--	15	--	ns
t_r	Rise Time		--	9	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	60	--	
t_f	Fall Time		--	11	--	
Q_g	Total Gate Charge	$V_{DD}=20V, I_D=85A, V_{GS}=10V$	--	125	--	nC
Q_{gs}	Gate to Source Charge		--	18	--	
Q_{gd}	Gate to Drain (" Miller ") Charge		--	14	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
t_{rr}	Reverse Recovery Time	$I_S=170A, T_J=25^{\circ}C$ $dI_F/dt=100A/\mu s, V_{GS}=0V$	--	35	--	ns
Q_{rr}	Reverse Recovery Charge		--	125	--	μC
I_S	Continuous Source Current a2(Body Diode)		--	--	250	A
V_{SD}	Diode Forward Voltagea3	$I_S=80A, V_{GS}=0V$	--	--	1.2	V

a1: Repetitive Rating: Pulse width limited by maximum junction temperature

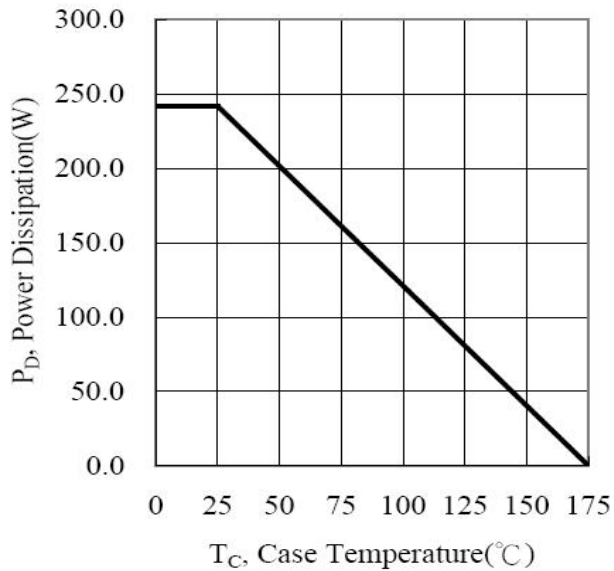
a2: Surface Mounted on FR4 Board, $t \leq 10sec$

a3: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycles $\leq 2\%$

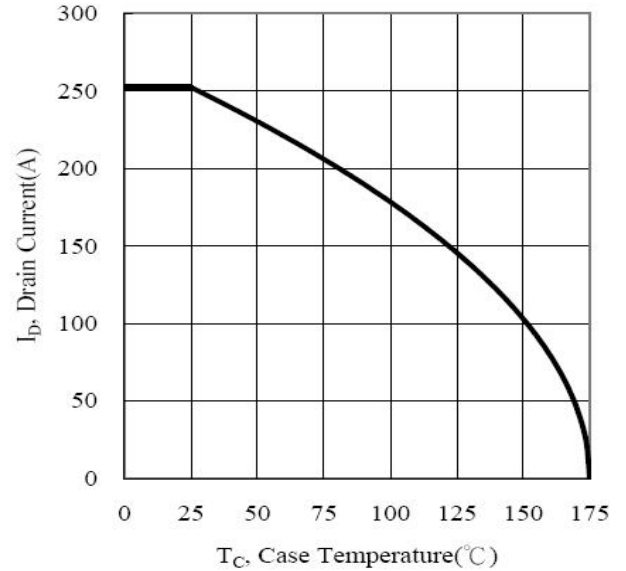
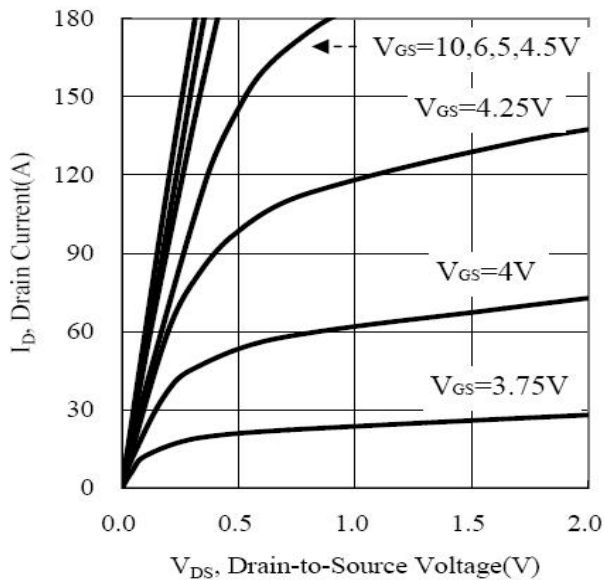
a4: Guaranteed by design, not subject to production

Characteristics Curves

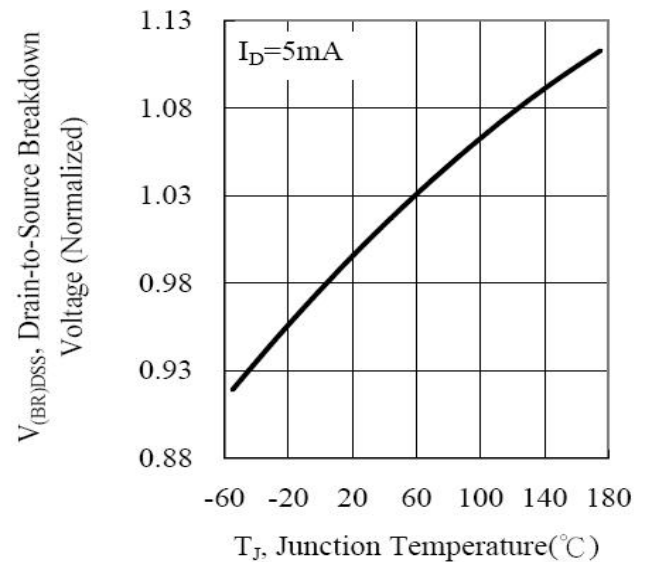
1. Power Dissipation



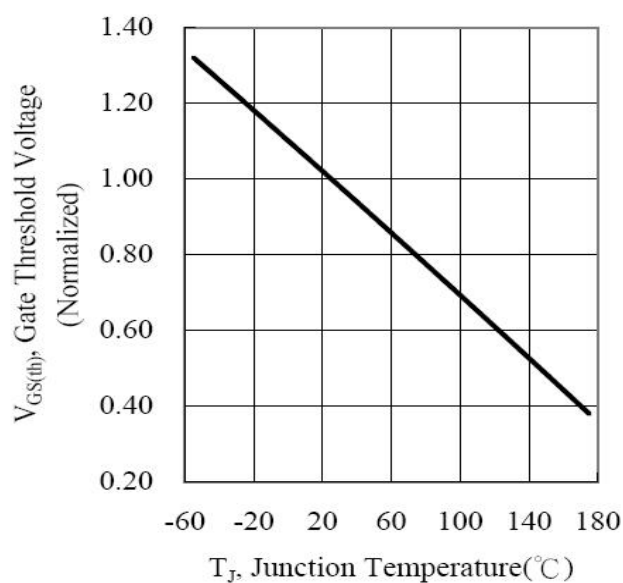
2. Drain Current


3. Output Characteristics $T_C=25^\circ\text{C}$


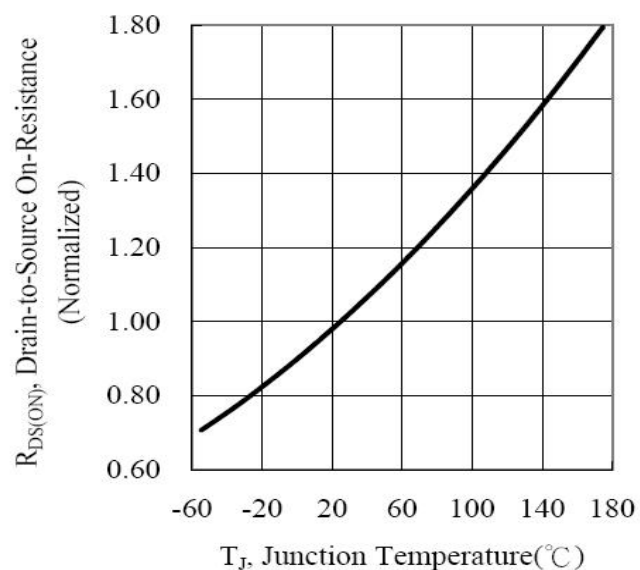
4. Drain-to-Source Breakdown Voltage



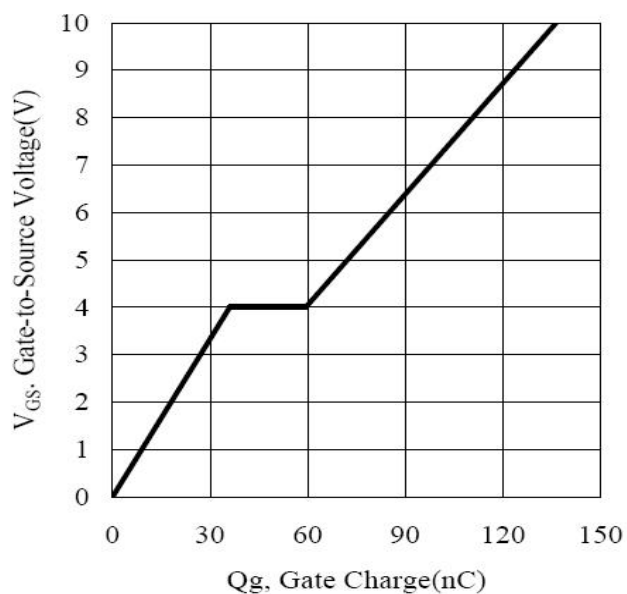
5. Gate Threshold Voltage



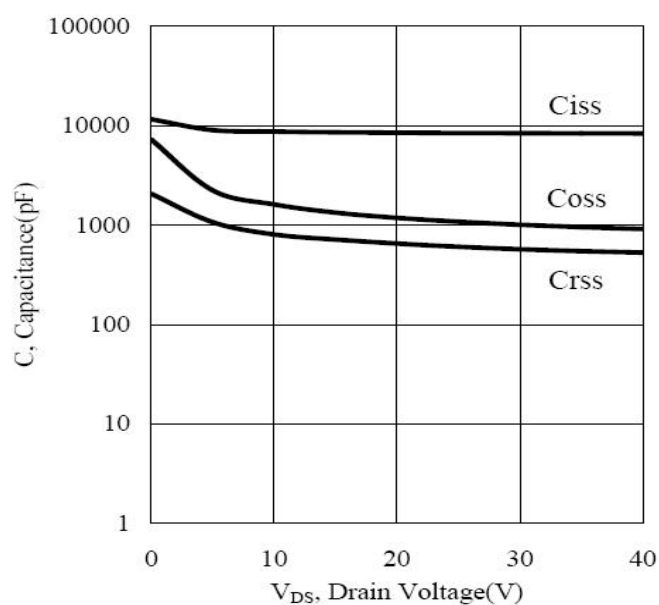
6. Drain-to-Source On-Resistance



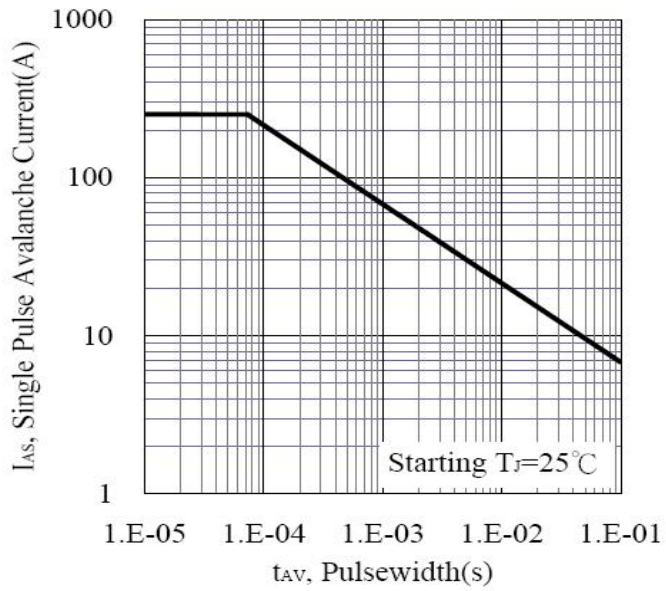
7. Typ. Gate Charge



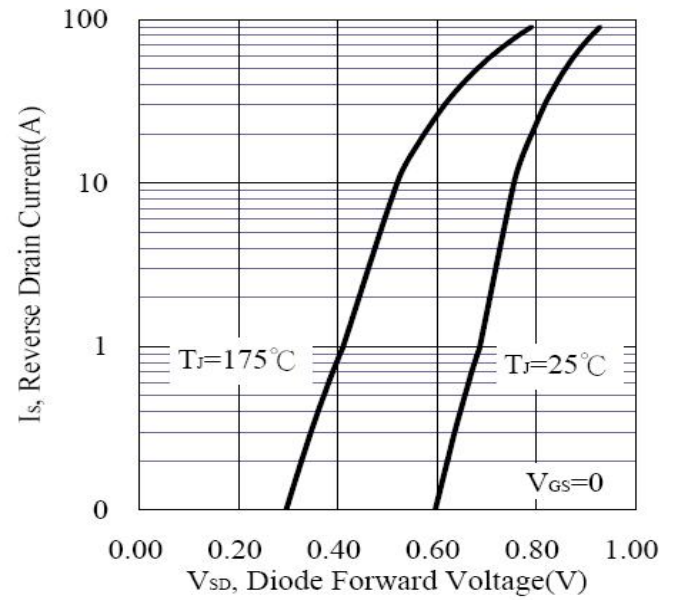
8. Typ. Capacitance



9. Avalance Characteristics

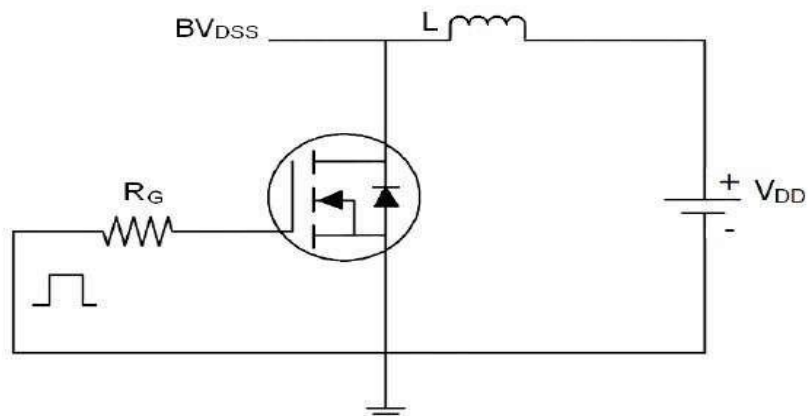


10. Forward Characteristics of reverse diode

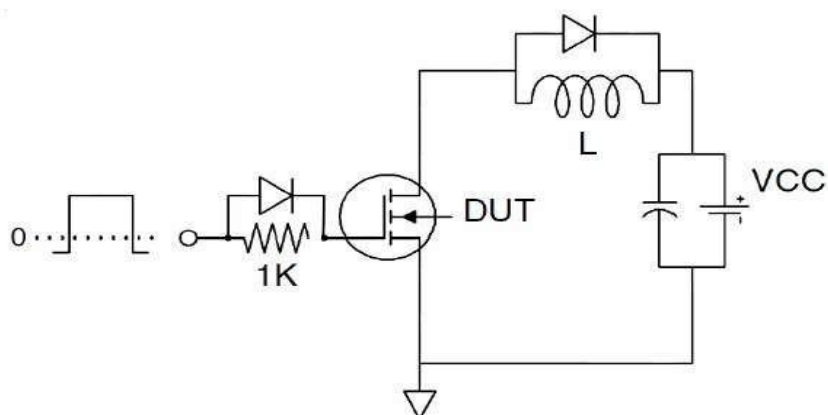


Test Circuit and Waveform

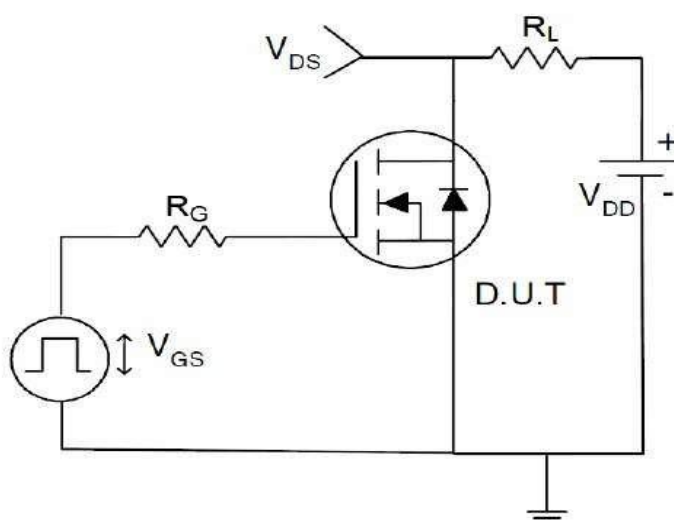
1) EAS test Circuit



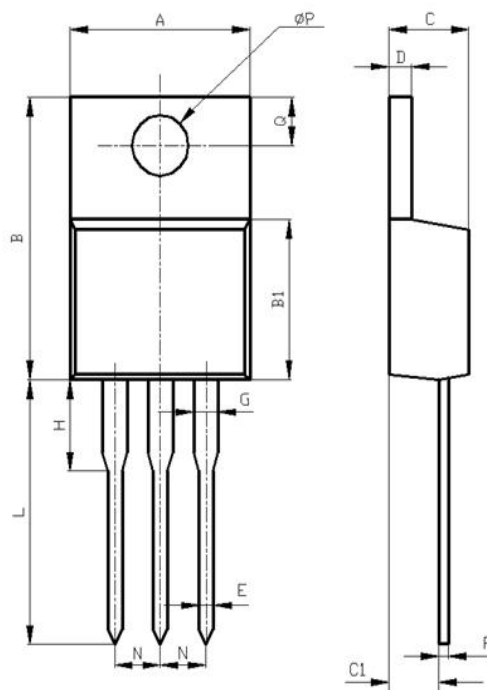
2) Gate charge test Circuit



3) Switch Time Test Circuit



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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