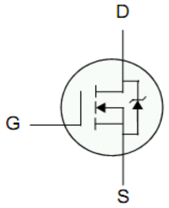
Silicon N-Channel Power MOSFET ®

HGP018N04A

V_{DSS}	40	V
I_D（Silicon limited）	280	A
I_D（Package limited）	120	A
P_D	201.6	W
$R_{DS(ON)Typ}$	1.45	mΩ

TO-220AB

1.Gate 2. Drain 3. Source



General Description:

HGP018N04A, the silicon N-channel Enhanced VDMOSFETs, is obtained by the high density Trench technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. This device is suitable for use as A load switch and PWM applications. the package form is TO-220AB, which accords with the RoHS standard.

Features:

- Fast Switching
- Low ON Resistance
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test
- Halogen Free

Applications:

Power switch circuit of adaptor and charger.

Absolute（T_j= 25℃ unless otherwise specified）:

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	40	V
I_D	Continuous Drain Current T_C = 25 °C（Silicon limited）	280	A
	Continuous Drain Current T_C = 25 °C (Package limited)	120	A
	Continuous Drain Current T_C = 100 °C	120	A
I_{DM} [a1]	Pulsed Drain Current T_C = 25 °C	480	A
V_{GS}	Gate-to-Source Voltage	±18	V
E_{AS} [a2]	Avalanche Energy	781.2	mJ
P_D	Power Dissipation T_C = 25 °C	201.6	W
	Derating Factor above 25°C	1.61	W/°C
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, –55 to 150	°C

Electrical Characteristics（Tj= 25℃ unless otherwise specified）:

OFF Characteristics

Symbol	Parameter	Test Conditions	Rating Min.	Rating Typ.	Rating Max.	Units
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	40	--	--	V
I_{DSS}	Drain to Source Leakage Current	VDS =40V, VGS= 0V, Tj = 25°C	--	--	1	μA
		VDS =32V, VGS= 0V, Tj = 125°C	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	VGS=18V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	VGS=-18V	--	--	-100	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Rating Min.	Rating Typ.	Rating Max.	Units
$R_{DS(ON)}$	Drain-to-Source On-Resistance	VGS=10V,ID=19A	--	1.45	1.8	mΩ
		VGS=4.5V,ID=19A	--	1.9	2.4	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1	1.5	2	V

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating Min.	Rating Typ.	Rating Max.	Units
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	--	0.8	--	Ω
C_{iss}	Input Capacitance	VGS = 0V VDS = 20V f = 1.0MHz	--	6120	--	pF
C_{oss}	Output Capacitance		--	3371	--	
C_{rss}	Reverse Transfer Capacitance		--	206	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating Min.	Rating Typ.	Rating Max.	Units
$t_{d(ON)}$	Turn-on Delay Time	VGS=10V Rg=1.6Ω VDD=20V Id=19A	--	22.2	--	ns
tr	Rise Time		--	22	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	75.6	--	
t_f	Fall Time		--	18.4	--	
Q_g	Total Gate Charge	VGS = 10V VDD=20V Id=19A	--	113.4	--	nC
Q_{gs}	Gate to Source Charge		--	13.4	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	26.9	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	T_C = 25 °C	--	--	120	A
I_{SM}	Maximum Pulsed Current (Body Diode)	T_C = 25 °C	--	--	480	A
V_{SD}	Diode Forward Voltage	IS=19A,VGS=0V	--	--	1.2	V
trr	Reverse Recovery Time	IS=19A di/dt=100A/us, VGS=0V	--	84.5	--	ns
Qrr	Reverse Recovery Charge	IS=19A di/dt=100A/us, VGS=0V	--	154.7	--	nC
Pulse width tp≤300μs,δ≤2%						

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	0.62	℃/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	℃/W

Notes:

a1：Repetitive rating; pulse width limited by maximum junction temperature

a2：L=0.5mH,Ias=55.9A Start TJ=25℃

a3：Recommend soldering temperature defined by IPC/JEDEC J-STD 020

Characteristics Curve:

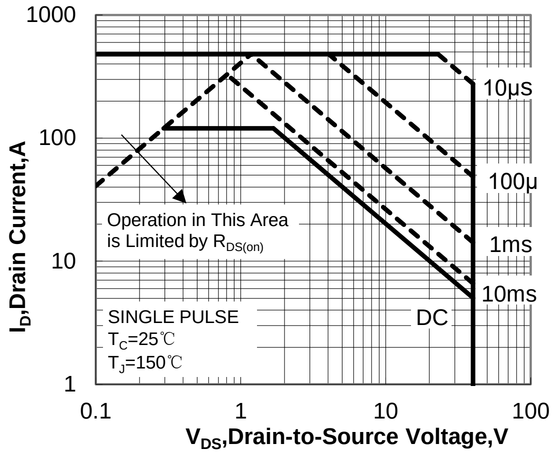


Figure 1 . Maximum Safe Operating Area

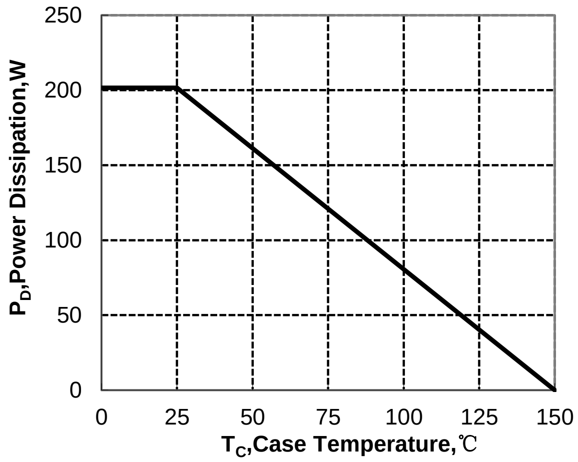


Figure 2. Maximum Power Dissipation vs Case Temperature

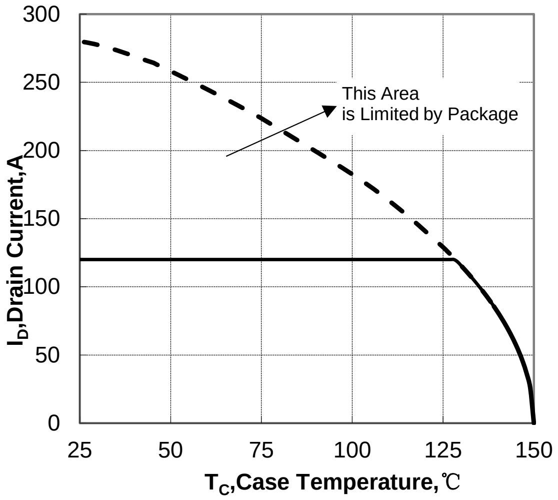


Figure 3. Maximum Continuous Drain Current vs Case Temperature

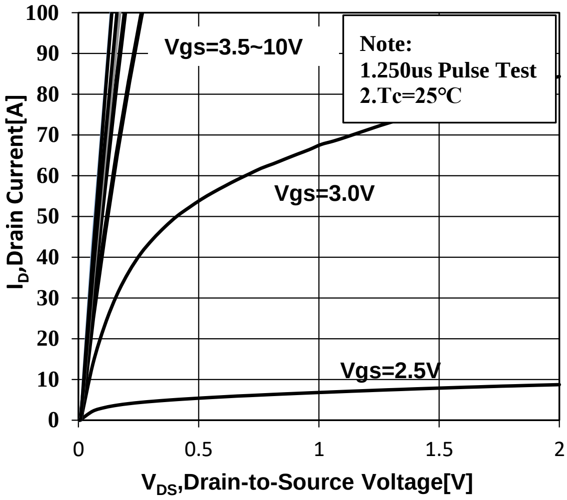


Figure 4. Typical output Characteristics

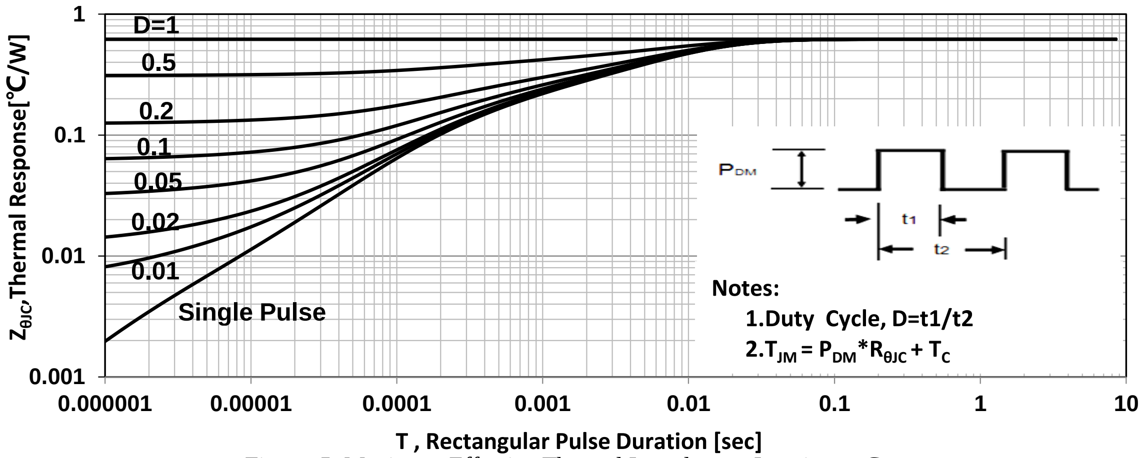


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

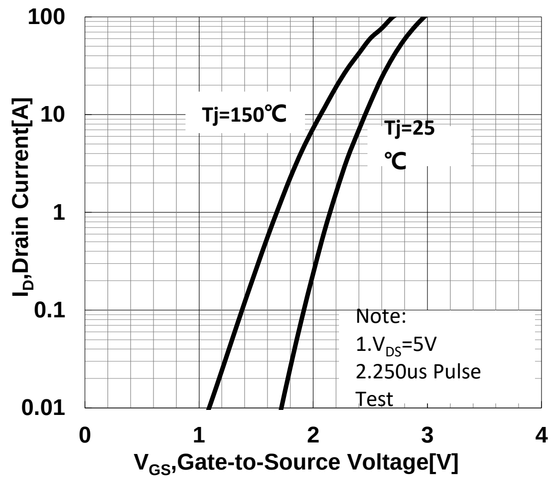


Figure 6 Typical Transfer Characteristics

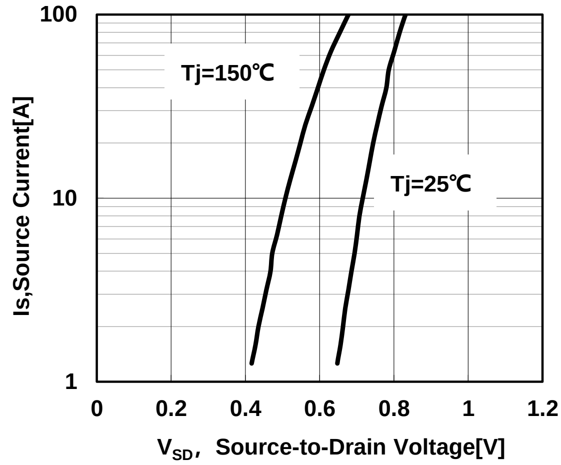


Figure 7 Typical Body Diode Transfer Characteristics

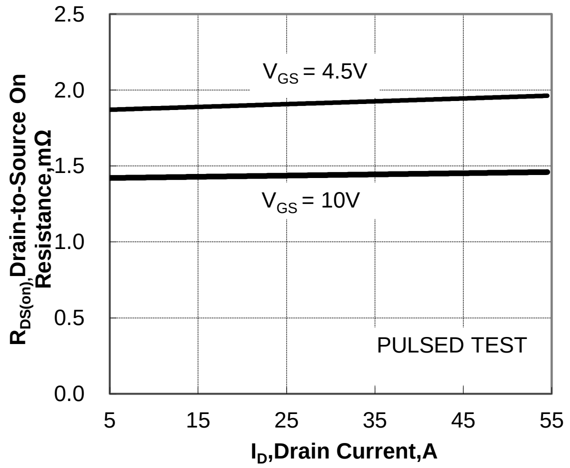


Figure 8. Drain-to-Source On Resistance vs Drain Current

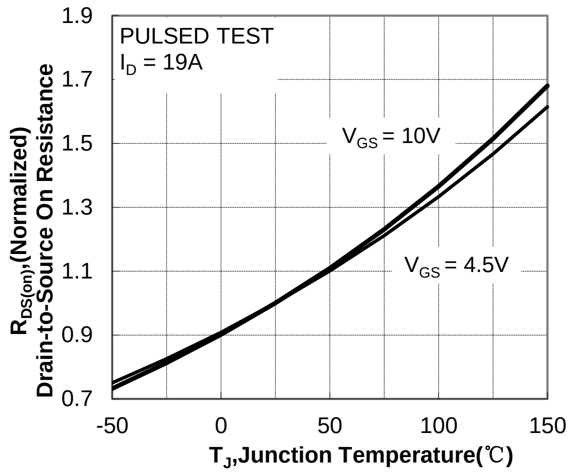


Figure 9. Normalized On Resistance vs Junction Temperature

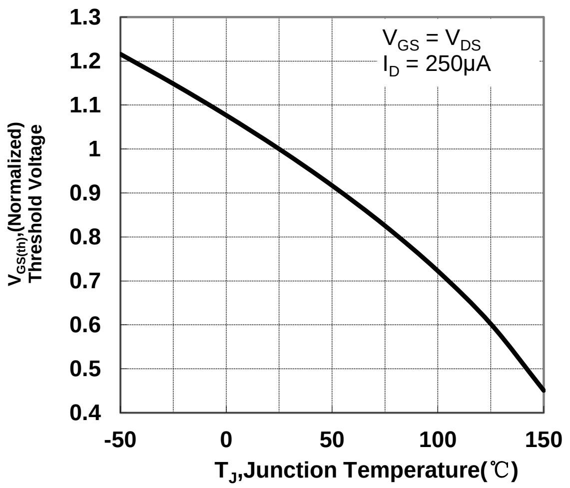


Figure10. Normalized Threshold Voltage vs Junction Temperature

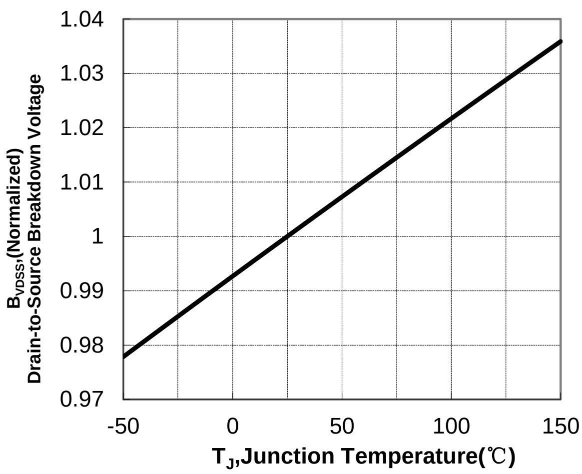


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

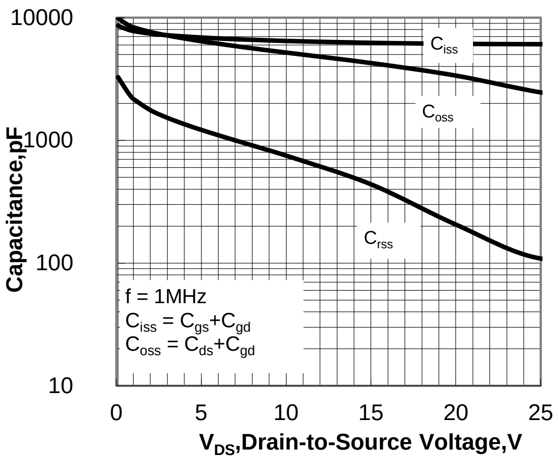


Figure 12. Capacitance Characteristics

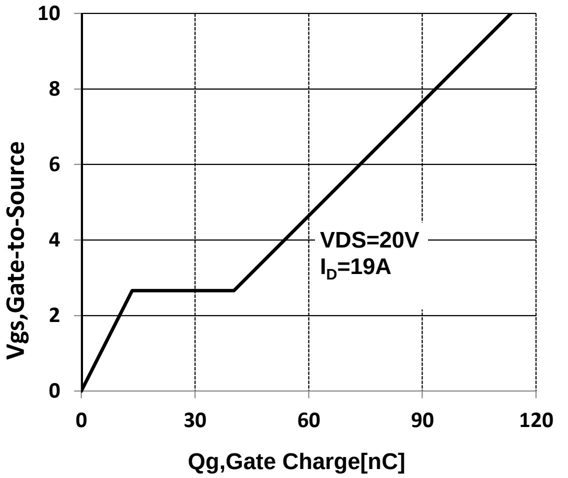


Figure 13 Typical Gate Charge vs Gate to Source Voltage

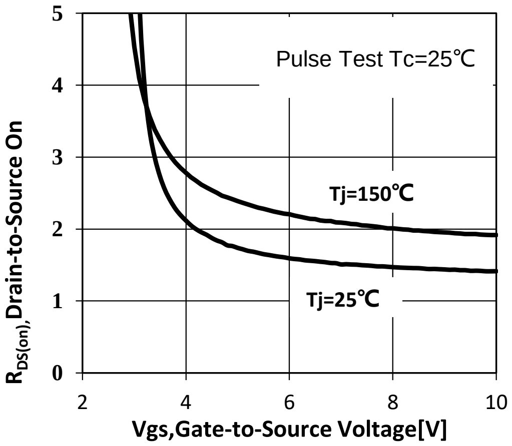


Figure 14. Drain-to-Source On Resistance vs Gate to Source Voltage

Test Circuit and Waveform

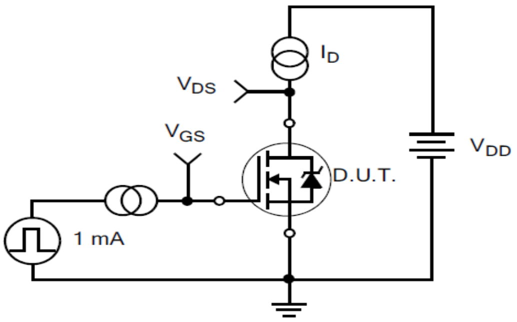


Figure 15. Gate Charge Test Circuit Waveforms

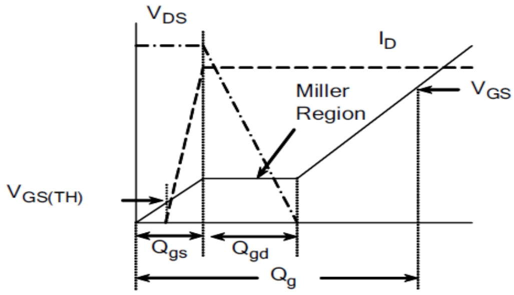


Figure 16. Gate Charge

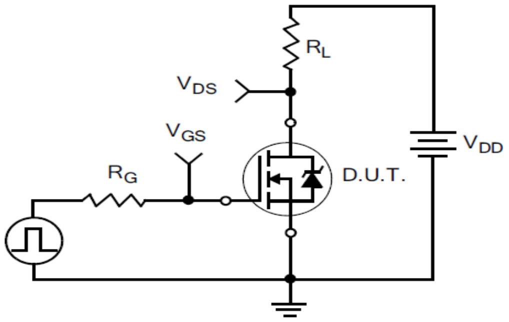


Figure 17. Resistive Switching Test Circuit

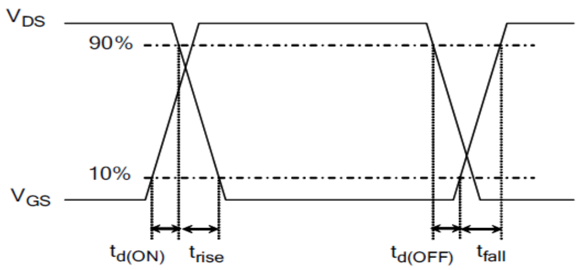


Figure 18. Resistive Switching

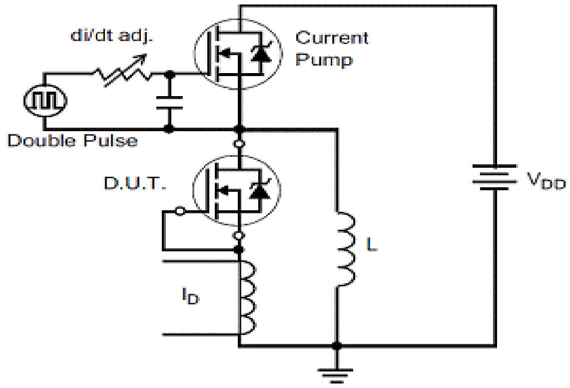


Figure 19. Diode Reverse Recovery Test Circuit

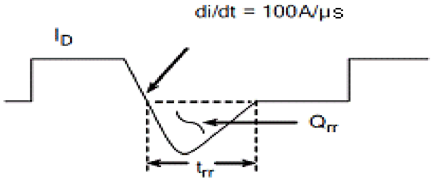


Figure 20. Diode Reverse Recovery

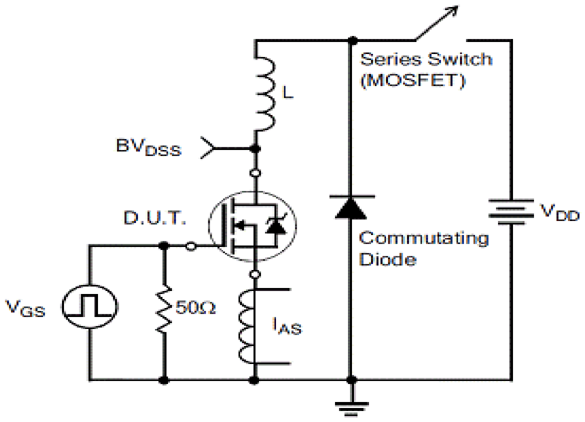


Figure21.Unclamped Inductive Switching Test Circuit

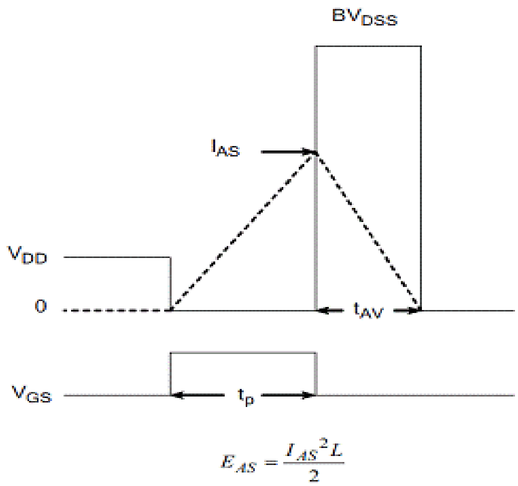
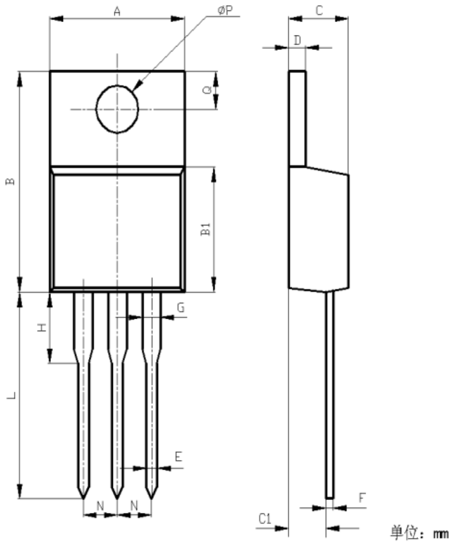


Figure22.Unclamped Inductive Switching

Package Information:



Symbol	Values(mm)	
	MIN	MAX
A	9.6	10.6
B	15	16
B1	8.9	9.5
C	4.3	4.8
C1	2.3	3.1
D	1.2	1.4
E	0.7	0.9
F	0.3	0.6
G	1.17	1.37
H	2.7	3.8
L*	12.6	14.8
N	2.34	2.74
Q	2.4	3
ΦP	3.5	3.9

TO-220AB Package

The name and content of poisonous and harmful material in products

Part's Name	Hazardous Substance									
	Pb	Hg	Cd	Cr (VI)	PBB	PBDE	DIBP	DEHP	DBP	BBP
Limit	≤ 0.1%	≤ 0.1%	≤ 0.01%	≤ 0.1%	≤ 0.1%	≤ 0.1%	≤ 0.1%	≤ 0.1%	≤ 0.1%	≤ 0.1%
Lead Frame	○	○	○	○	○	○	○	○	○	○
Molding	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○	○	○	○	○
Solder	×	○	○	○	○	○	○	○	○	○
Note	○：Means the hazardous material is under the criterion of 2011/65/EU. ×：Means the hazardous material exceeds the criterion of 2011/65/EU. The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup's RoHS.									

Warnings

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. It is suggested to be used under 80 percent of the maximum ratings of the device.
2. When installing the heatsink, please pay attention to the torsional moment and the smoothness of the heatsink.
3. VDMOSFETs 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. This publication is made by Huajing Microelectronics and subject to regular change without notice.

WUXI CHINA RESOURCES HUAJING MICROELECTRONICS CO., LTD.

Add：No.14 Liangxi RD. Wuxi, Jiangsu, China Mail:214061 http://www. crhj.com.cn
Tel: +86 0510-85807228 Fax: +86- 0510-85800864

Marketing Part： Post：214061 Tel：+86 0510-81805277/81805336
Fax：+86 0510-85800360/85803016

Application and Service：Post：214061 Tel / Fax：+86- 0510-81805243/81805110