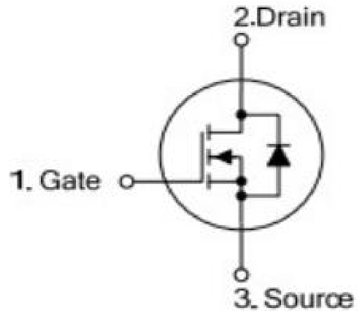
迈诺斯科技

MP20N40

Description

MP20N40, 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.



TO-220

KEY CHARACTERISTICS

Parameter	Value	Unit
V_{DS}	400	V
I_D	20	A
$R_{DS(ON).Typ}$	0.22	Ω

FEATURES

① Fast Switching
② Low Crss
③ 100% avalanche tested
④ Improved dv/dt capability
⑤ RoHS produc

APPLICATIONS

① High frequency switching mode power supply
② Electronic ballast

ORDERING INFORMATION

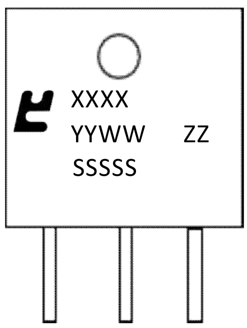
Ordering Codes	Package	Product Code	Packing
MP20N40-P	TO-220	20N40	Tube

MP20N40-P

(2) Package type

(1) Chip name

(1) MP20N40: 400V 20A (2) P:TO-220



XXXX： Product Code

YYWW： Year&Week

ZZ： Assembly Code

SSSSS： Lot Code

ABSOLUTE RATINGS

at TC = 25°C, unless otherwise specified

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	400	V
I_D	Continuous Drain Current	20	A
	Continuous Drain Current TC = 100 °C	12.6	A
I_{DM}	Pulsed Drain Current(Note1)	76	A
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy(Note2)	900	mJ
dv/dt	Peak Diode Recovery dv/dt(Note3)	5.0	V/ns
P_D	Power Dissipation TO-220	278	W
	Derating Factor above 25°C	2.2	W/℃
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150，–55 to 150	℃
T_L	Maximum Temperature for Soldering	300	℃

Thermal characteristics

Thermal characteristics TO-220

Symbol	Parameter	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	0.45	℃/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	℃/W

Electrical Characteristics

at TC = 25°C, unless otherwise specified

OFF Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	400	--	--	V
ΔBVDSS/Δ TJ	Bvdss Temperature Coefficient	I_D=250uA, Reference25℃	--	0.45	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS} =400V, V_{GS}= 0V, T_j = 25℃	--	--	1	μA
		V_{DS} =320V， V_{GS}= 0V, T_j = 125℃	--	--	10	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+30V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-30V	--	--	-100	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On- Resistance	V_{GS}=10V, I_D=4A (Note4)	--	0.22	0.27	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA (Note4)	2	3	4	V
g_{fs}	Forward Transconductance	V_{DS}=15V, I_D =9.5A (Note4)	--	10.0	--	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
R_g	Gate resistance	f = 1.0MHz	--	1.4	--	Ω
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=25V f= 1.0MHz	--	2300	--	PF
C_{oss}	Output Capacitance		--	210	--	
C_{rss}	Reverse Transfer Capacitance		--	3.3	--	

Switching Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D=20A V_{DD}= 250V V_{GS} =10V R_G =10Ω	--	32	--	ns
t_r	Rise Time		--	26	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	80	--	
t_f	Fall Time		--	35	--	
Q_g	Total Gate Charge	I_D =20A V_{DD} =320V V_{GS} = 10V	--	40	--	nC
Q_{gs}	Gate to Source Charge		--	12.5	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	10.5	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	T_C=25 °C	--	--	20	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	76	A
V_{SD}	Diode Forward Voltage	I_S=20A, V_{GS}=0V(Note4)	--	--	1.2	V
T_{rr}	Reverse Recovery Time	I_S=20A, T_j = 25°C dIF/dt=100A/us,	--	285	--	ns
Q_{rr}	Reverse Recovery Charge		--	3900	--	nC

Note1: Pulse width limited by maximum junction temperature
Note2: L=10mH, VDs=50V, Start TJ=25℃
Note3: ISD =20A,di/dt ≤100A/us,VDD≤BVDS, Start TJ=25℃
Note4: Pulse width tp≤300μs, δ≤2%

Characteristics Curves

Figure 1a Safe Operating Area (No FullPAK)

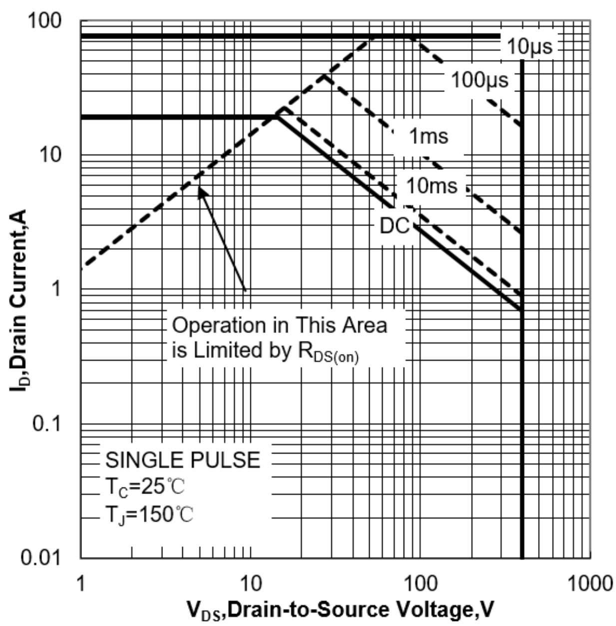


Figure 1b Safe Operating Area (FullPAK)

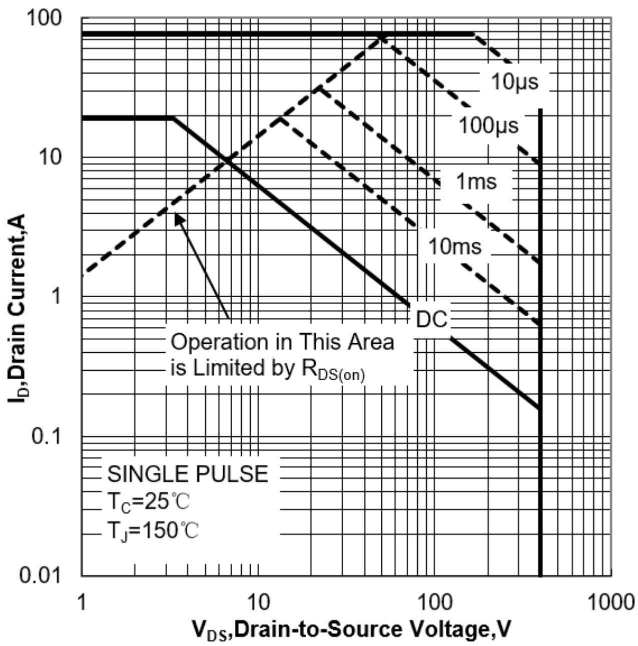


Figure 2a Power Dissipation (No FullPAK)

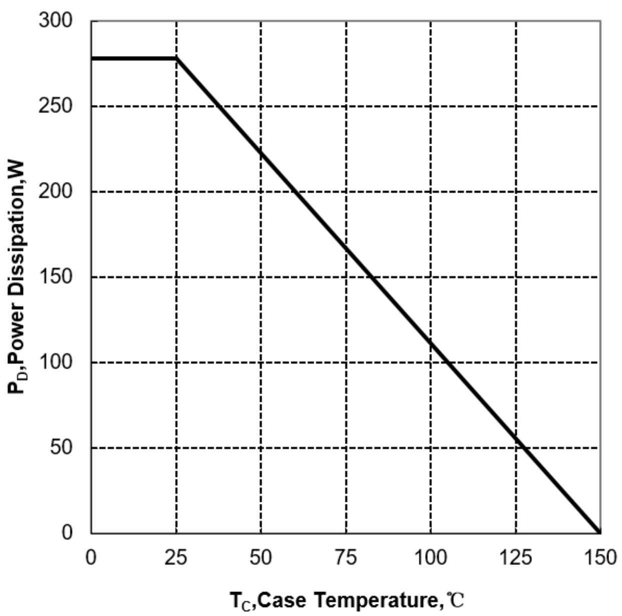


Figure 2b Power Dissipation (FullPAK)

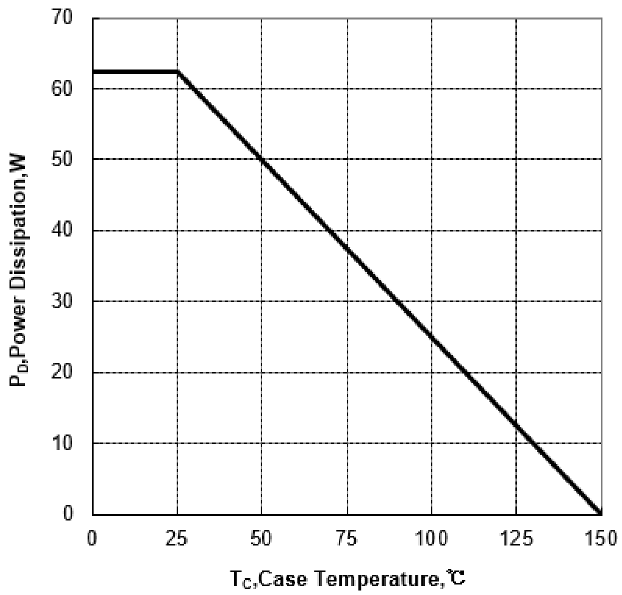


Figure 3a Max Thermal Impendance (No FullPAK)

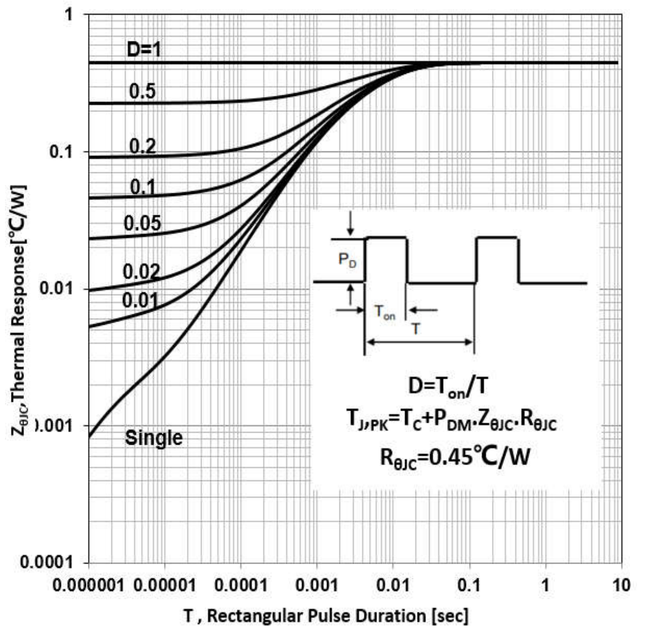


Figure 3b Max Thermal Impendance (FullPAK)

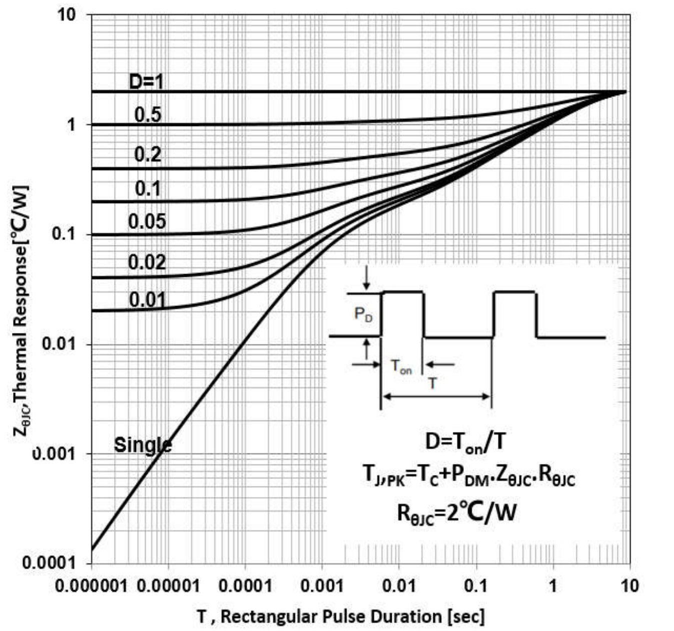


Figure 4 Typical Output Characteristics

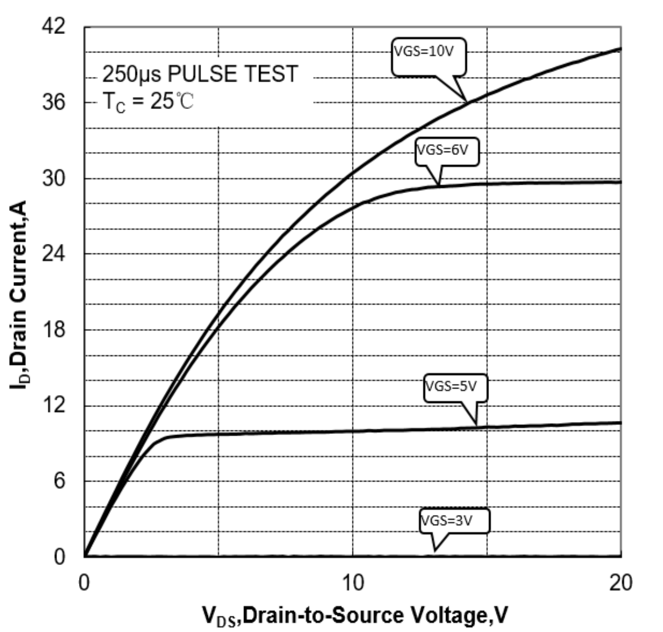


Figure 5 Typical Transfer Characteristics

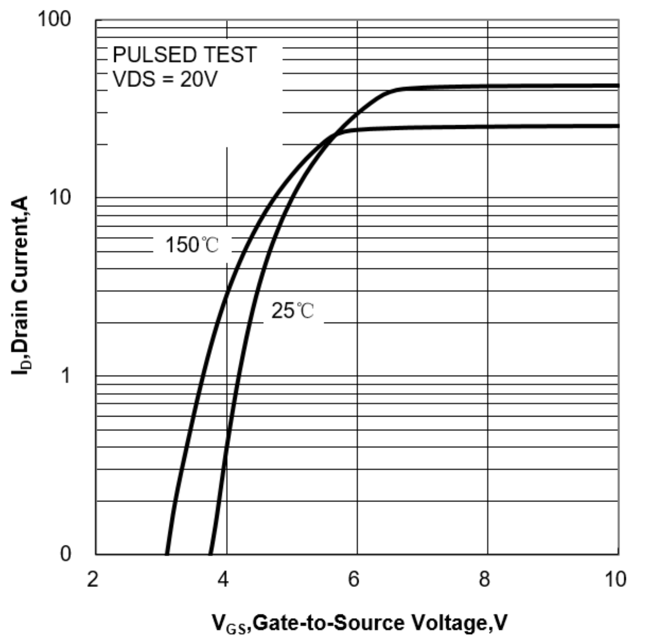


Figure 6 Typical Drain to Source ON Resistance vs Drain Current	Figure 7 Typical Drian to Source on Resistance vs Junction Temperature

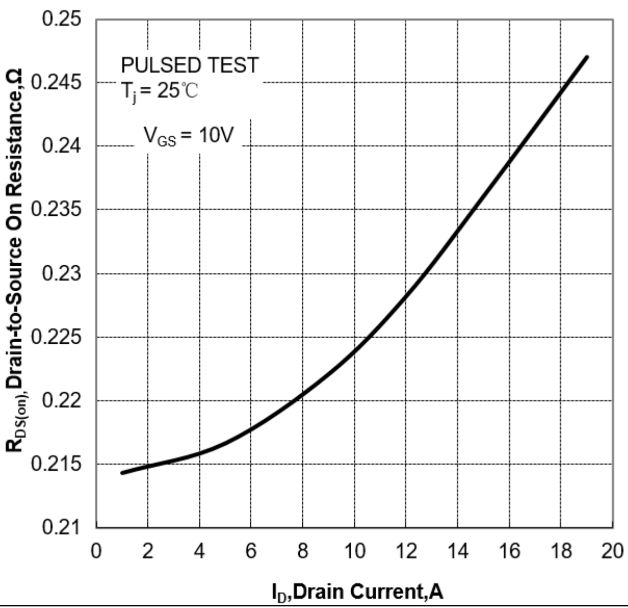
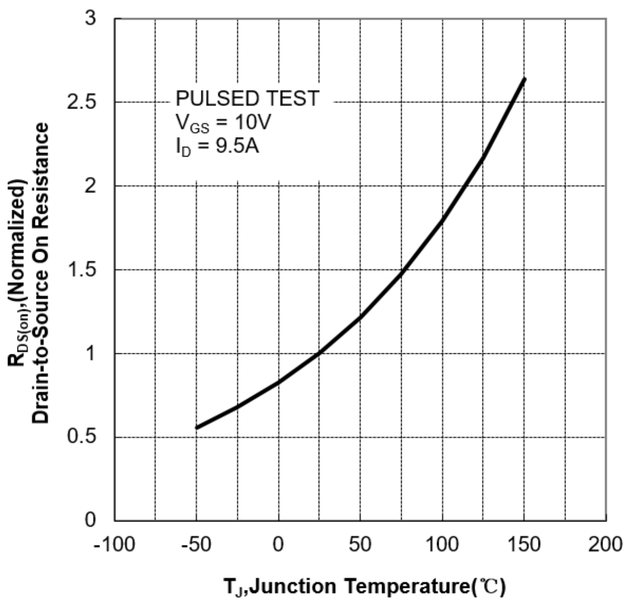

	

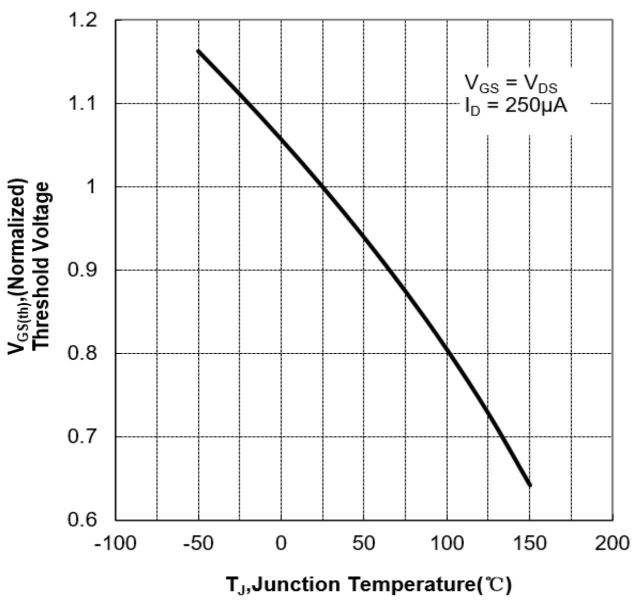
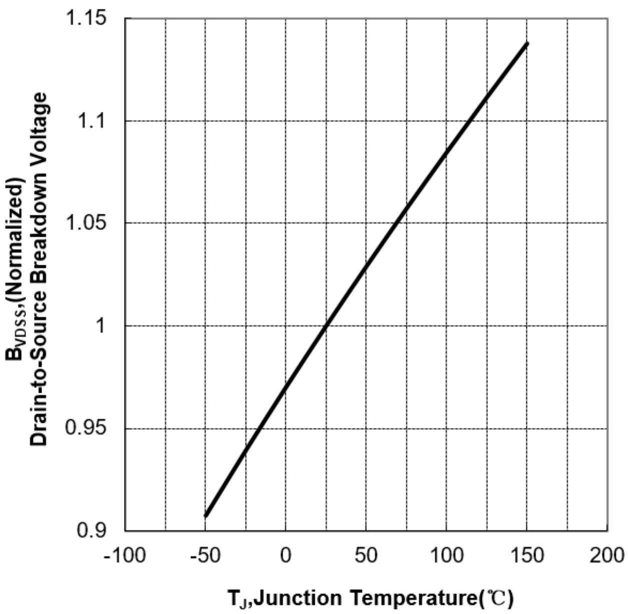
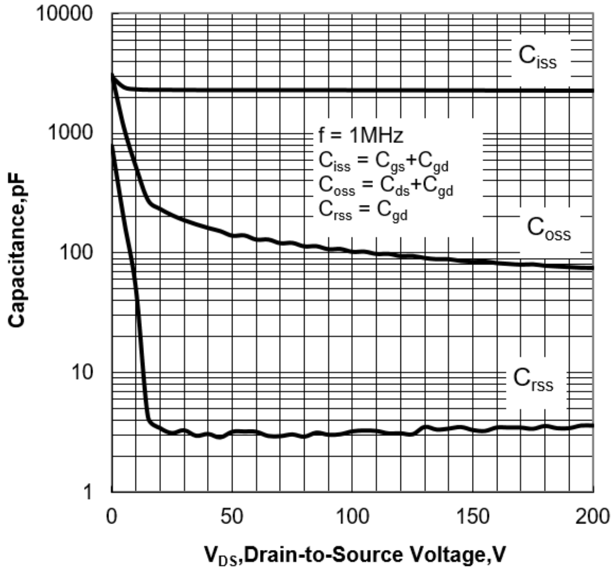
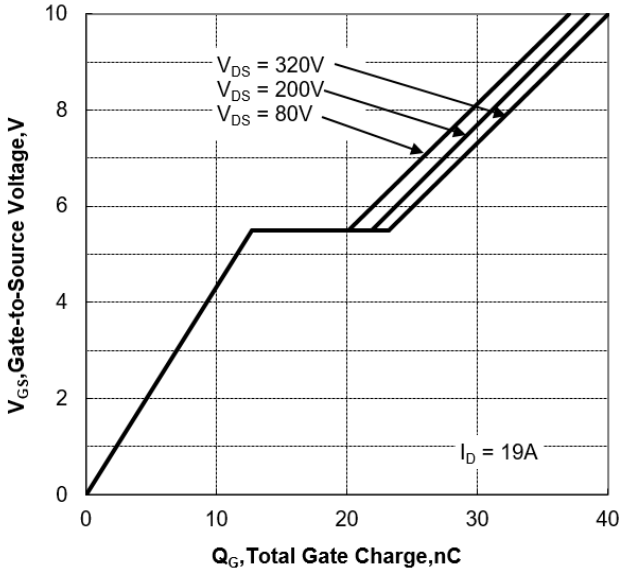
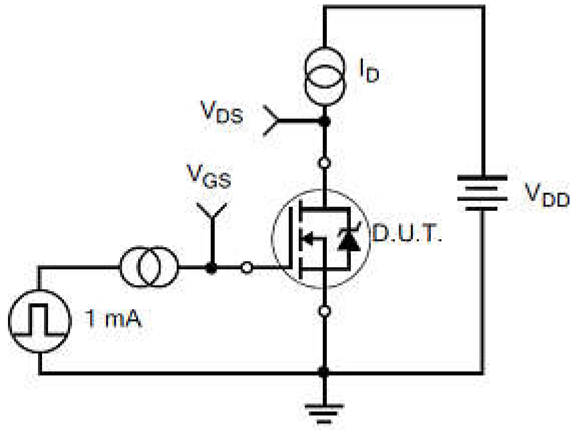
Figure 8 Typical Theshold Voltage vs Junction Temperature	**Figure 9 Typical Breakdown Voltage vs Junction Temperature**
	

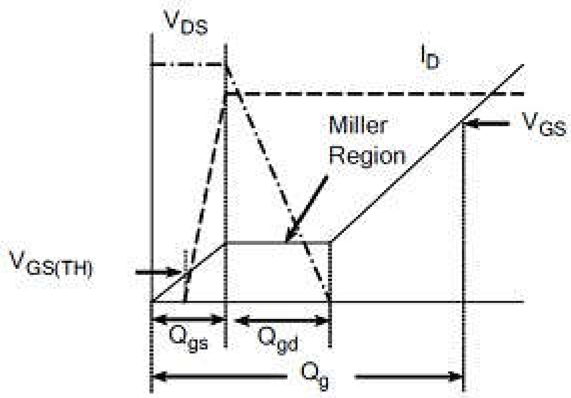
Figure 10 Typical Capacitance vs Drain to Source Voltage	Figure 11 Typical Gate Charge vs Gate to Source Voltage
	

Test Circuit and Waveform

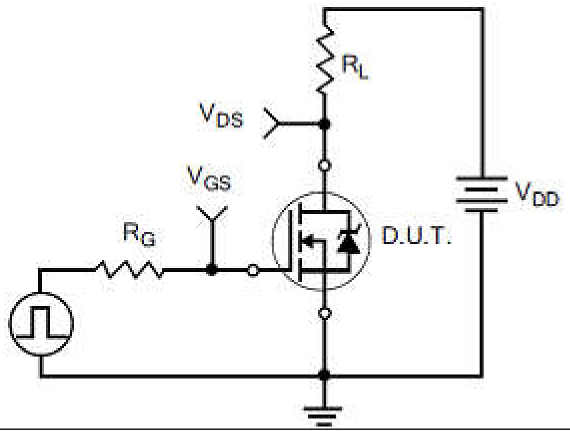
Gate Charge Test Circuit



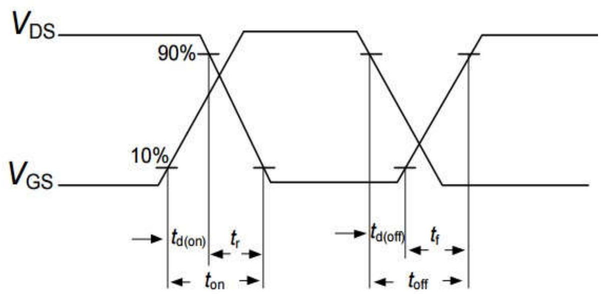
Gate Charge Waveforms



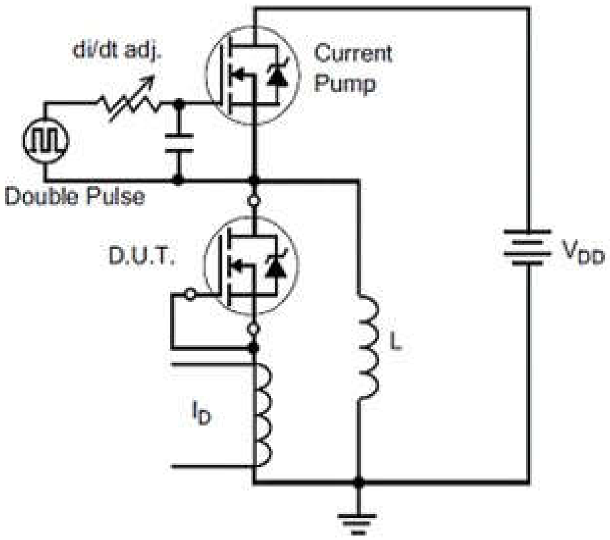
Resistive Switching Test Circuit



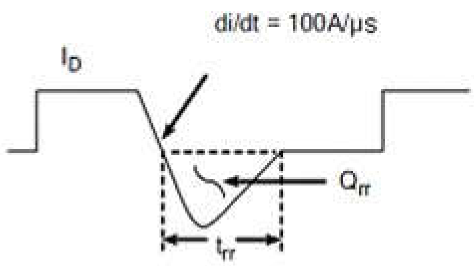
Resistive Switching Waveforms



Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



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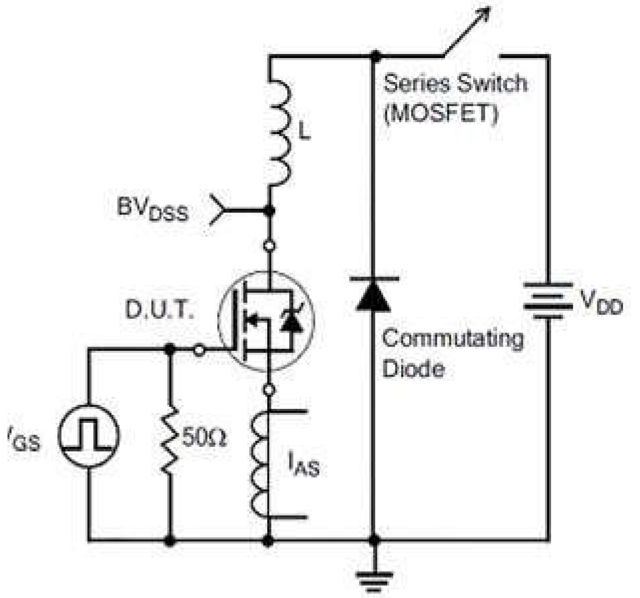

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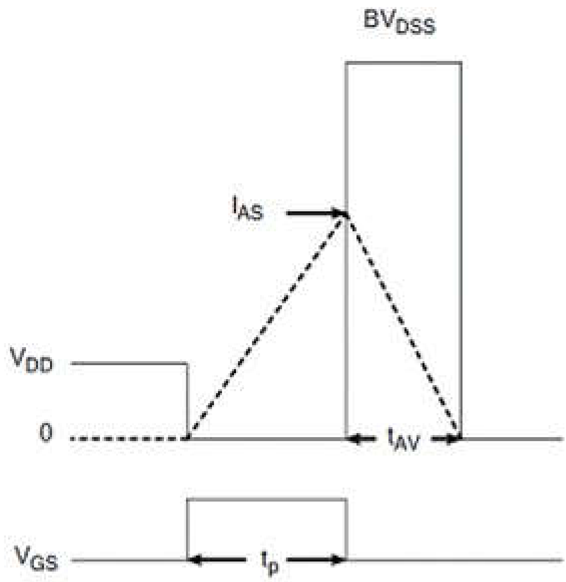

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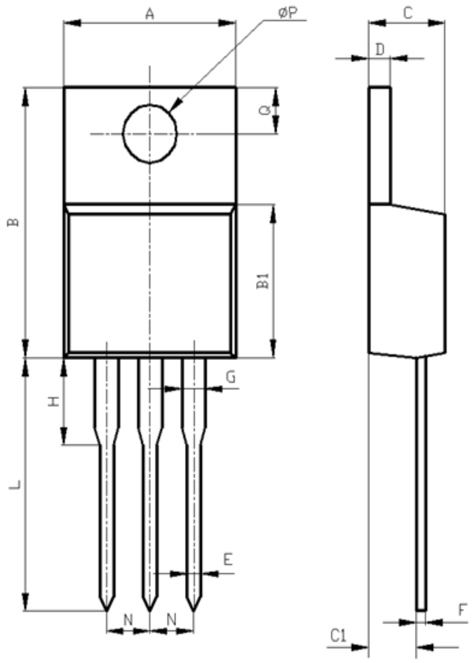
Package Description



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
Φ 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 withoutprior notice.

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