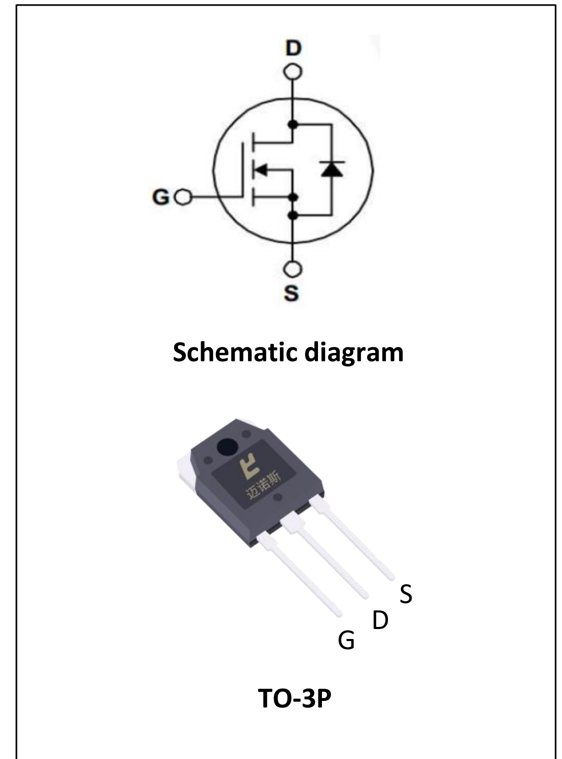
Minos
迈诺斯科技

FDA59N30

300V N-Channel Power MOSFET



Description

FDA59N30, 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.

General Features

① V_{DS} = 300V,I_D = 59A $R_{DS(ON)}$ < 41mΩ @ V_{GS}=10V
② Fast Switching Low Crss
③ 100% avalanche tested Improved
④ dv/dt capability
⑤ RoHS product

Application

① High frequency switching mode power supply

Package Marking And Ordering Information

Ordering Codes	Package	Product Code	Packing
FDA59N30	TO-3P	FDA59N30	Tube

ABSOLUTE RATINGS (at TC = 25°C, unless otherwise specified)

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	300	V
I_D	Continuous Drain Current	59	A
	Continuous Drain Current TC= 100 °C	36.6	A
I_{DM}	Pulsed Drain Current(Note1)	236	A
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy(Note2)	2600	mJ
dv/dt	Peak Diode Recovery dv/dt(Note3)	5.0	V/ns
P_D	Power Dissipation TO-3P	420	W
	Derating Factor above 25°C	3.5	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 (No FullPAK) TO-3P

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Junction-to-Case	0.29	℃/W
$R_{\theta JA}$	Junction-to-Ambient	40	℃/W

Electrical Characteristics (at T_C = 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	300	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	I_D=250uA, Reference 25℃	--	0.25	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS} =300V, V_{GS}=0V, Tj = 25℃	--	--	1	μA
		V_{DS} =240V, 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=29.5A(Note4)	--	32	41	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA(Note4)	2.0	3.0	4.0	V
g_{fs}	Forward Transconductance	V_{DS}=15V, I_D =40A(Note4)	--	52	--	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
R_g	Gate resistance	f = 1.0MHz	--	0.85	--	Ω
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=25V f=1.0MHz	--	9550	--	PF
C_{oss}	Output Capacitance		--	895	--	
C_{rss}	Reverse Transfer Capacitance		--	49	--	

Switching Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D =59A V_{DD}=150V V_{GS} = 10V R_G =20Ω	--	160	--	ns
tr	Rise Time		--	550	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	122	--	
t_f	Fall Time		--	198	--	
Q_g	Total Gate Charge	I_D =59A V_{DD}=240V V_{GS} = 10V	--	155	--	nC
Q_{gs}	Gate to Source Charge		--	46	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	40	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	T_C=25 °C	--	--	59	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	36.6	A
V_{SD}	Diode Forward Voltage	I_S=59A, V_{GS}=0V(Note4)	--	--	1.2	V
T_{rr}	Reverse Recovery Time	I_S=59A, T_j = 25°C dIF/dt=100A/us, V_{GS}=0V	--	236	--	ns
Q_{rr}	Reverse Recovery Charge		--	6879	--	nC
I_{rrm}	Reverse Recovery Current		--	58.3	--	A

Note1: Pulse width limited by maximum junction temperature
Note2: L=10mH, V_{DS}=50V, Start T_J=25℃
Note3: I_{SD} =59A,di/dt ≤100A/us,V_{DD}≤B_{VDS}, Start T_J=25℃
Note4: Pulse width tp≤300μs, δ≤2%

Characteristics Curves

Figure 1 Safe Operating Area

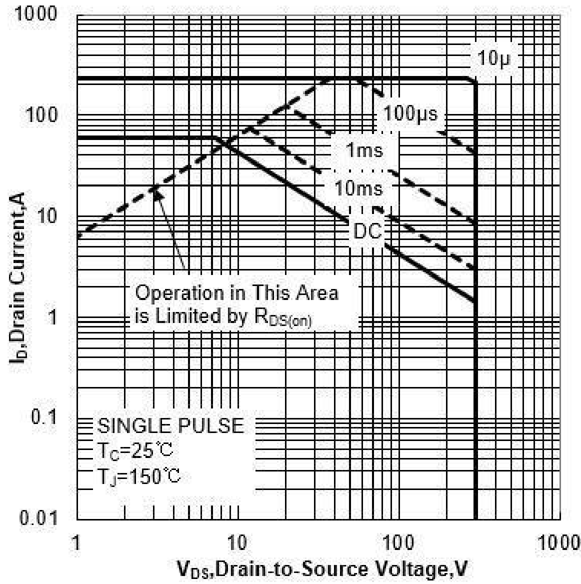


Figure 2 Power Dissipation

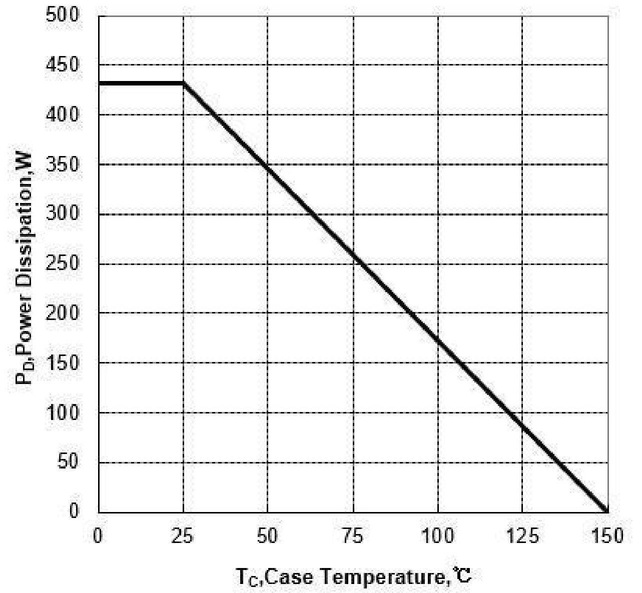


Figure 3 Max Thermal Impendance

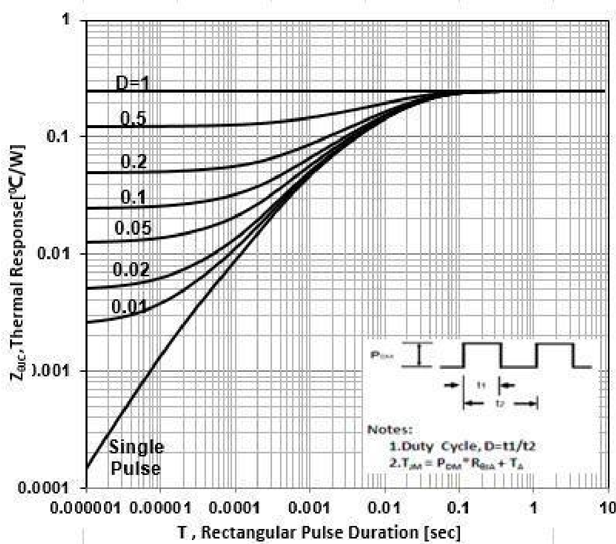


Figure 4 Typical Output Characteristics

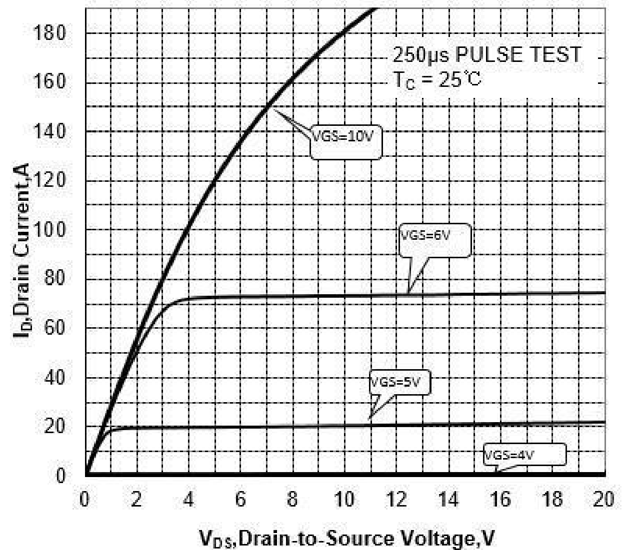


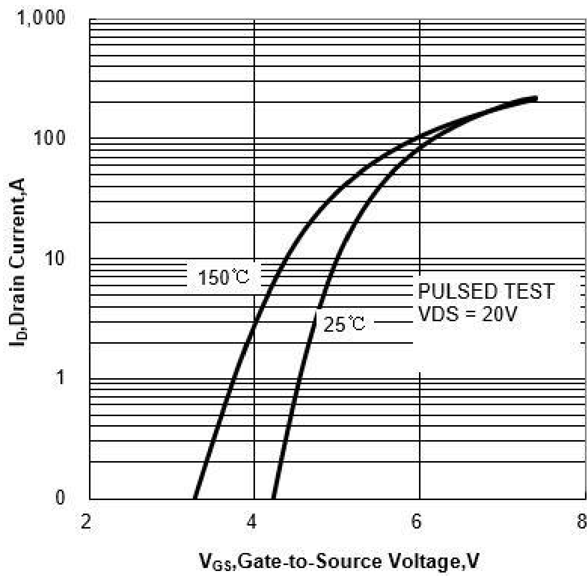
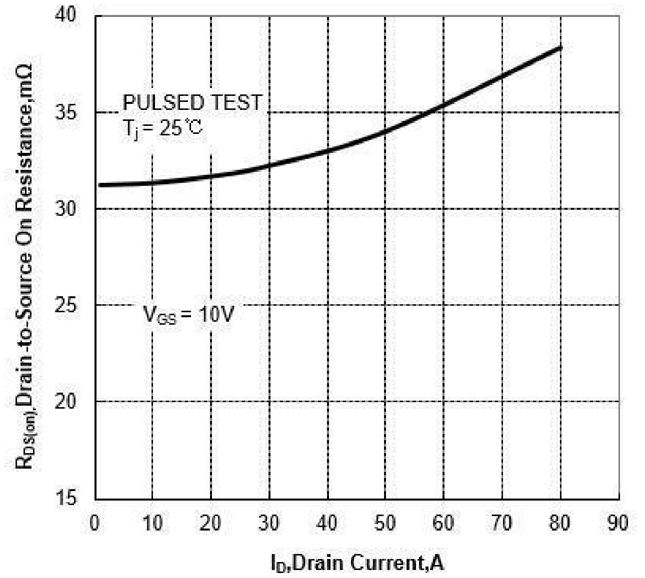
Figure 5 Typical Transfer Characteristics	Figure 6 Typical Drain to Source ON Resistance vs Drain Current
	

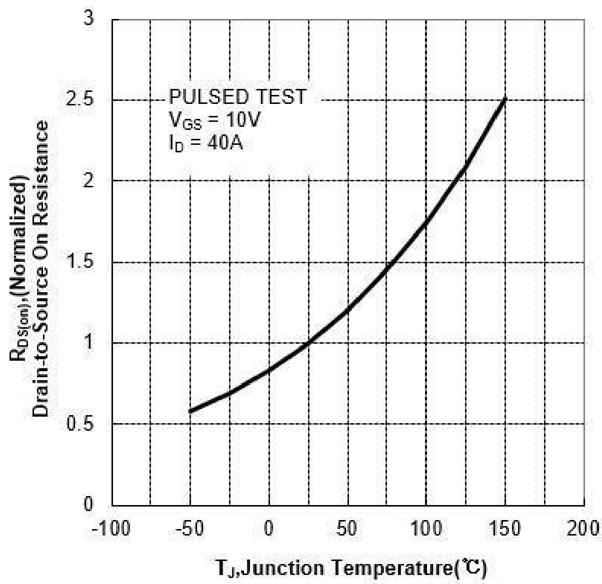
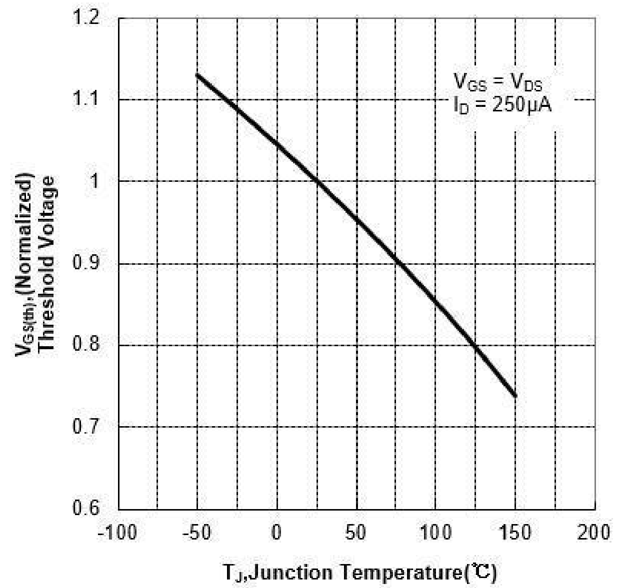
Figure 7 Typical Drian to Source on Resistance vs Junction Temperature	Figure 8 Typical Theshold Voltage vs Junction Temperature
	

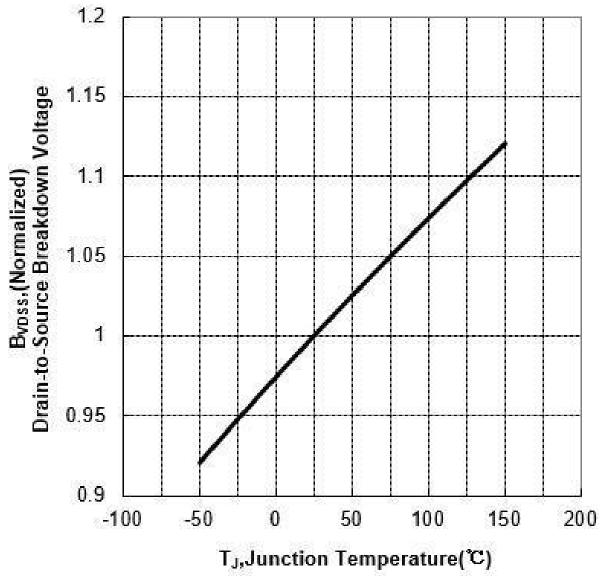
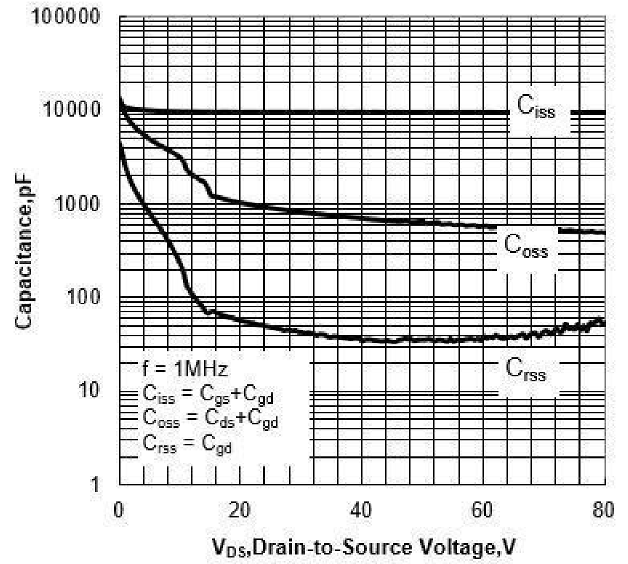
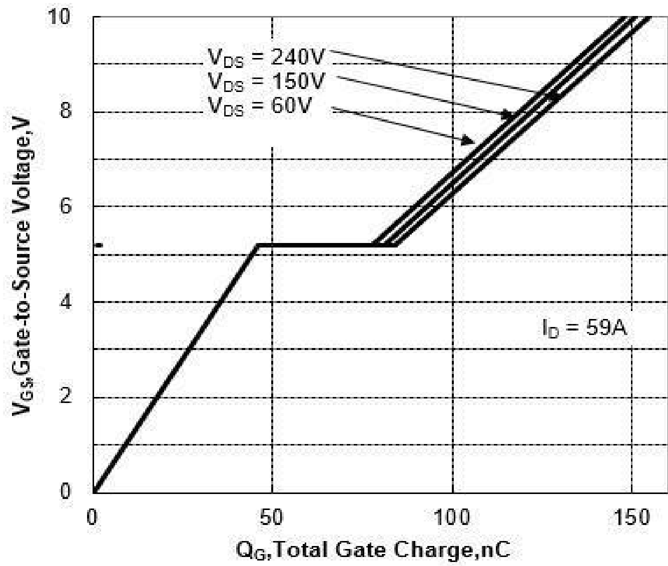
Figure 9 Typical Breakdown Voltage vs Junction Temperature	Figure 10 Typical Capacitance vs Drain to Source Voltage
	

Figure 11 Typical Gate Charge vs Gate to Source Voltage


Test Circuit and Waveform

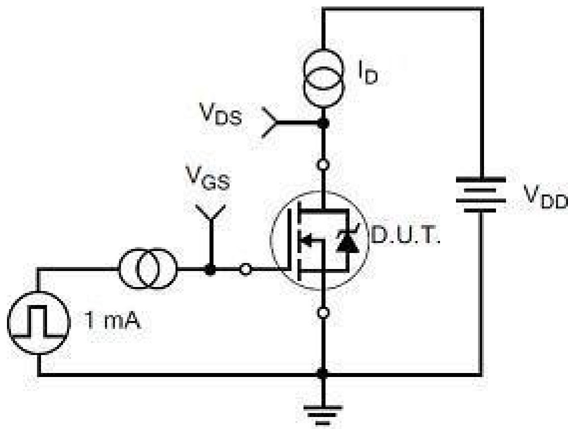
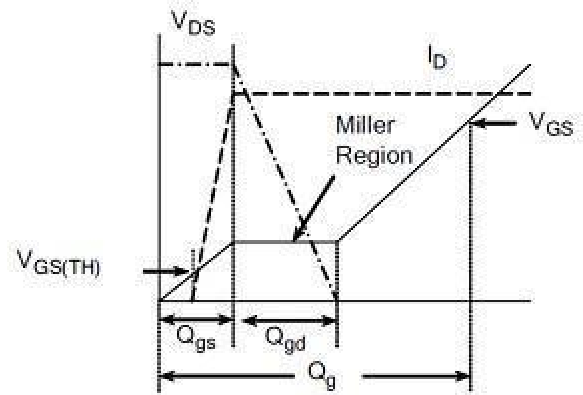
Figure 12 Gate Charge Test Circuit	Figure 13 Gate Charge Waveforms
	

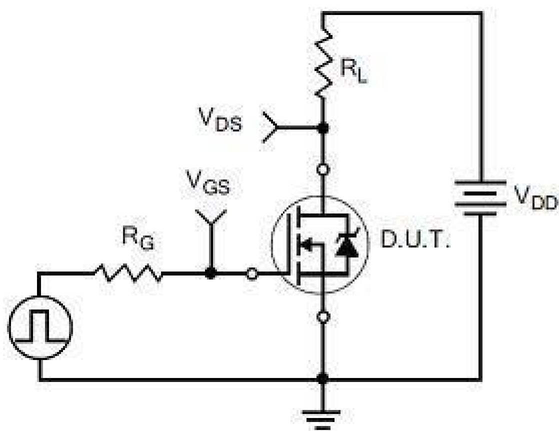
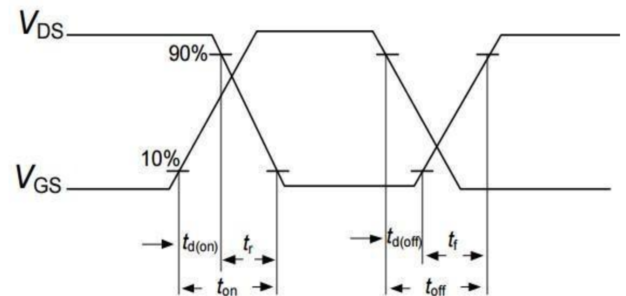
Figure 14 Resistive Switching Test Circuit	Figure 15 Resistive Switching Waveforms
	

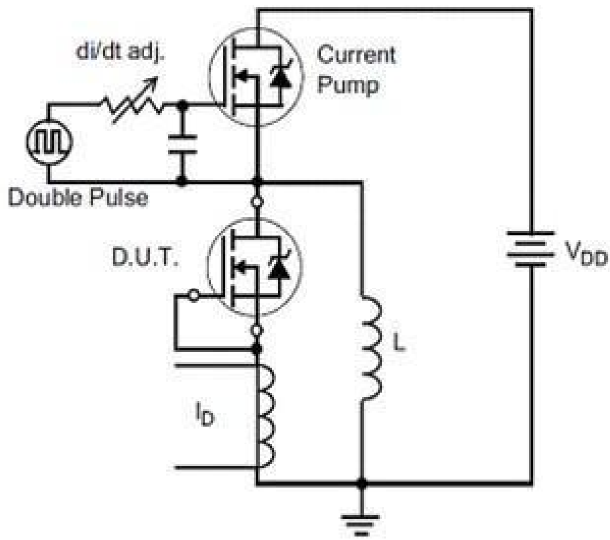
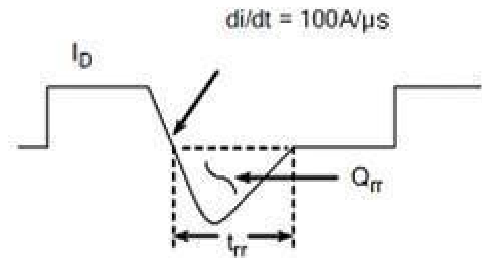
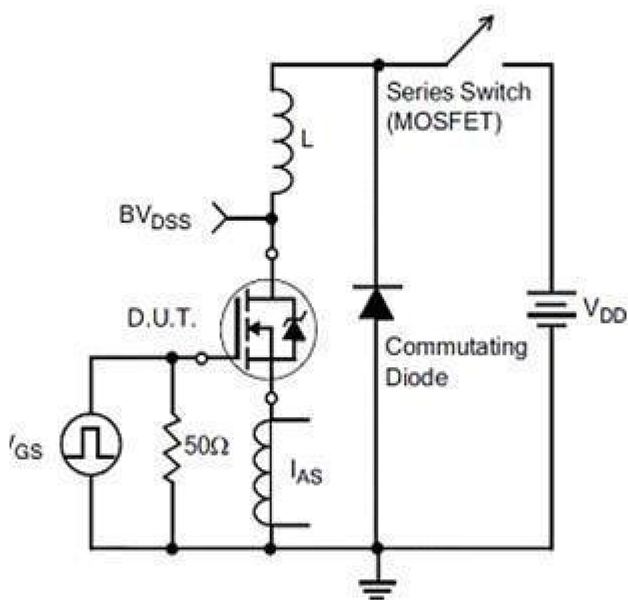
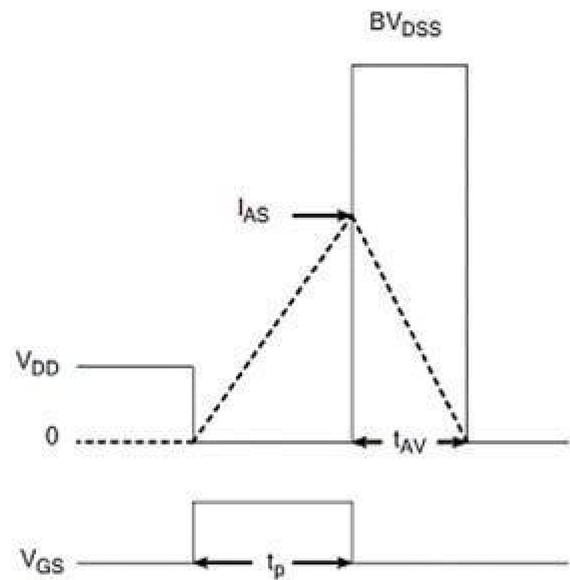
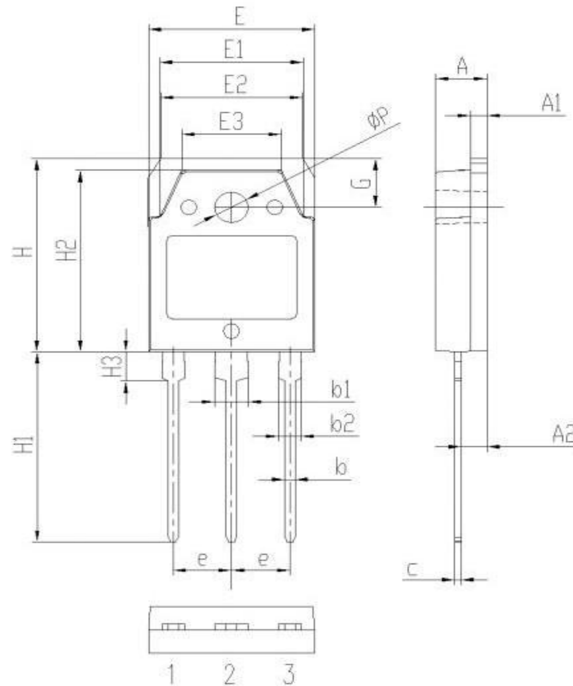
Figure 16 Diode Reverse Recovery Test Circuit	Figure 17 Diode Reverse Recovery Waveform
	

Figure 18 Unclamped Inductive Switching Test Circuit	Figure 19 Unclamped Inductive Switching Waveform
	

Package Information



Symbol	Values(mm)	
	MIN	MAX
A	4.60	5.00
A1	1.30	1.70
A2	2.20	2.60
b	0.80	1.20
b1	2.90	3.30
b2	1.90	2.30
c	0.40	0.80
e	5.25	5.65
E	15.3	15.7
E1	13.2	13.6
E2	13.1	13.5
E3	9.10	9.50
H	19.7	20.1
H1	19.1	20.1
H2	18.3	18.7
H3	2.80	3.20
G	4.80	5.20
ϕp	3.00	3.40

TO-3P 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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