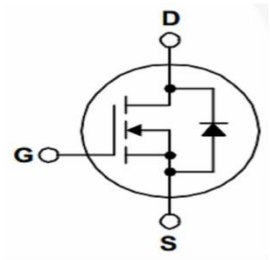
迈诺斯科技

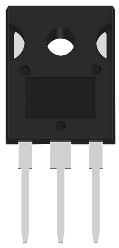
MD40N25

Silicon N-Channel Power MOSFET

Description

MD40N25 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.





G D S

TO247

General Features

①V_{DS}=250V, R_{dson}<80mΩ @V_{GS}=10V, I_D=40A (Typ:65mΩ)
②Fast Switching
③Low Crss (typical 18pF)
④100% avalanche tested
⑤Improved dv/dt capability
⑥RoHS product

Application

① High frequency switching mode power supply

Package Marking And Ordering Information:

Ordering Codes	Package	Product Code	Packing
MD40N25	TO-247	MD40N25	Tube

ABSOLUTE RATINGS @ Ta=25℃ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	250	V
I_D	Continuous Drain Current	40	A
	Continuous Drain Current T_C = 100 °C	26	A
I_{DM}	Pulsed Drain Current(Note1)	160	A
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy(Note2)	2000	mJ
dv/dt	Peak Diode Recovery dv/dt(Note3)	5.0	V/ns

PD	Power Dissipation	310	W
	Derating Factor above 25°C	2.78	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-247

Symbol	Parameter	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	0.36	℃/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	℃/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	250	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	ID=250uA, Reference25℃	--	0.18	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS} =250V, V_{GS}= 0V, Tj = 25℃	--	--	1	μA
		V_{DS} =200V, V_{GS}= 0V, Tj = 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	VGS=10V, ID=20A(Note4)	--	0.065	0.08	Ω

$V_{GS(TH)}$	Gate Threshold Voltage	VDS = VGS, ID = 250μA(Note4)	2.0	--	4.0	V
g_{fs}	Forward Transconductance	VDS=40V, ID =20A(Note4)	--	27	--	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values Min.	Values Typ.	Values Max.	Units
R_g	Gate resistance	f = 1.0MHz	--	1.8	--	Ω
C_{iss}	Input Capacitance	VGS = 0V VDS = 25V f =	--	3700	--	PF
C_{oss}	Output Capacitance		--	360	--	
C_{rss}	Reverse Transfer Capacitance		--	2.5	--	

Switching Characteristics

Symbol	Parameter	Test Conditions	Values Min.	Values Typ.	Values Max.	Units
$t_{d(ON)}$	Turn-on Delay Time	I_D =40A VDD = 125V VGS = 10V RG =15Ω	--	80	--	ns
tr	Rise Time		--	620	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	140	--	
t_f	Fall Time		--	183	--	
Q_g	Total Gate Charge	ID =40A VDD =200V VGS = 10V	--	40	--	nC
Q_{gs}	Gate to Source Charge		--	14	--	
Q_{gd}	Gate to Drain ("Miller")Charge		--	11	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Values Min.	Values Typ.	Values Max.	Units
I_S	Continuous Source Current (Body Diode)	TC=25 °C	--	--	40	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	160	A
V_{SD}	Diode Forward Voltage	IS=40A, VGS=0V(Note4)	--	--	1.2	V
T_{rr}	Reverse Recovery Time	IS=40A, Tj = 25°C dIF/dt=100A/us, VGS=0V	--	230	--	ns
Q_{rr}	Reverse Recovery Charge		--	2150	--	nC

Note1: Pulse width limited by maximum junction temperature

Note2: L=10mH, VDs=50V, Start TJ=25℃

Note3: ISD =40A,di/dt ≤100A/us,VDD≤BVDS, Start TJ=25℃

Note4: Pulse width tp≤300μs, δ≤2%

Characteristics Curves

Figure 1 Safe Operating Area

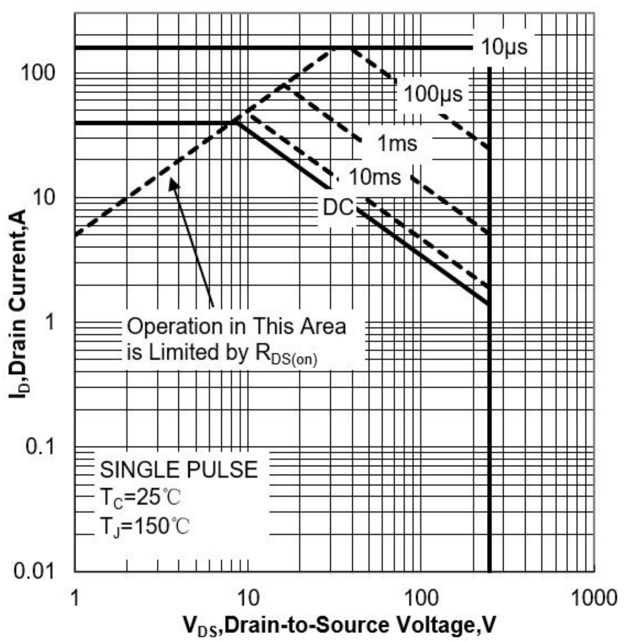


Figure 2 Power Dissipation

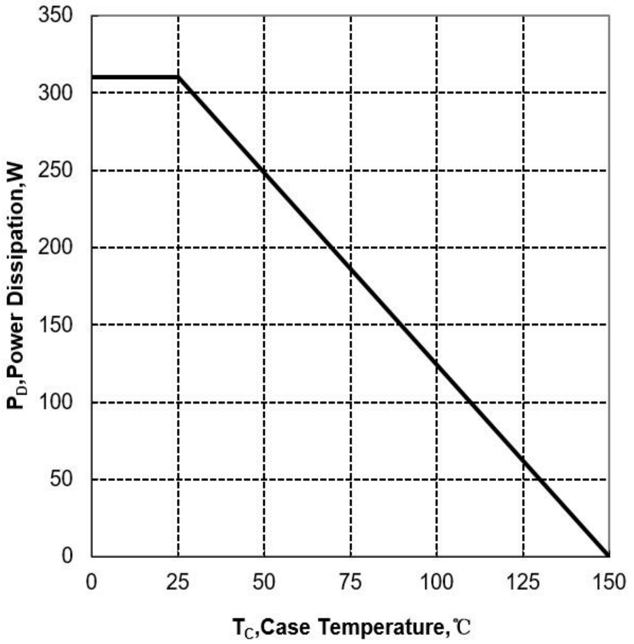


Figure 3 Max Thermal Impendance

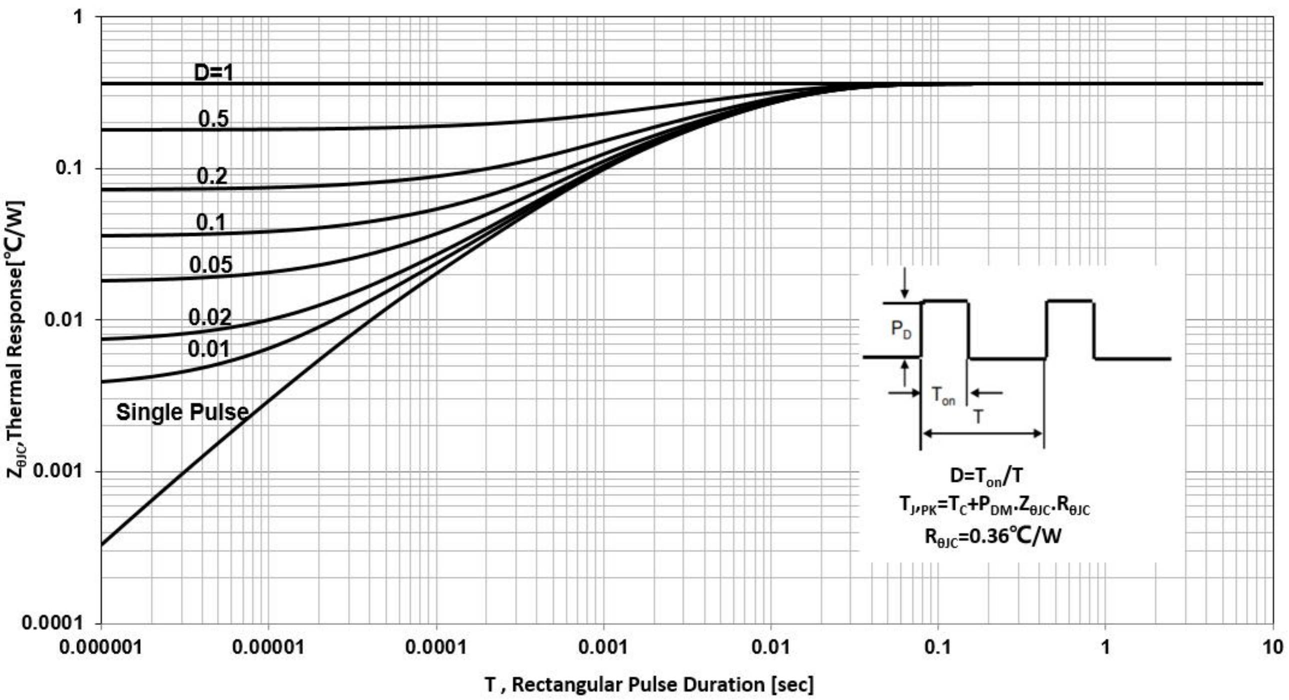


Figure 4 Typical Output Characteristics

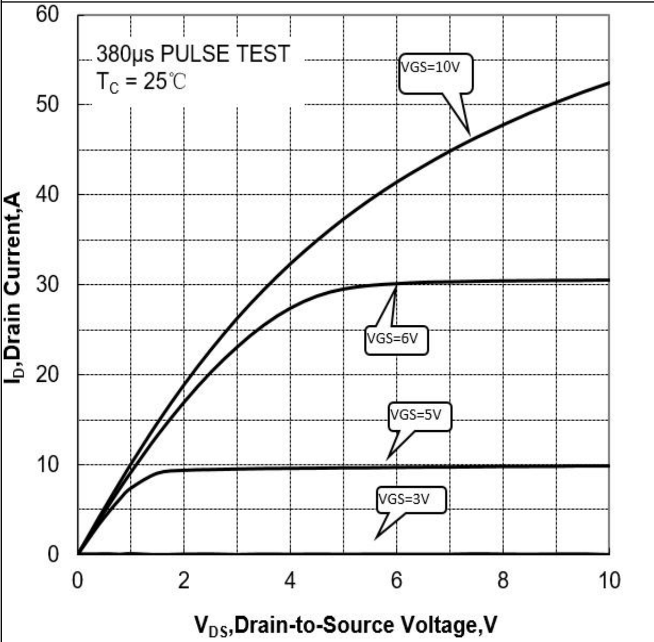


Figure 5 Typical Transfer Characteristics

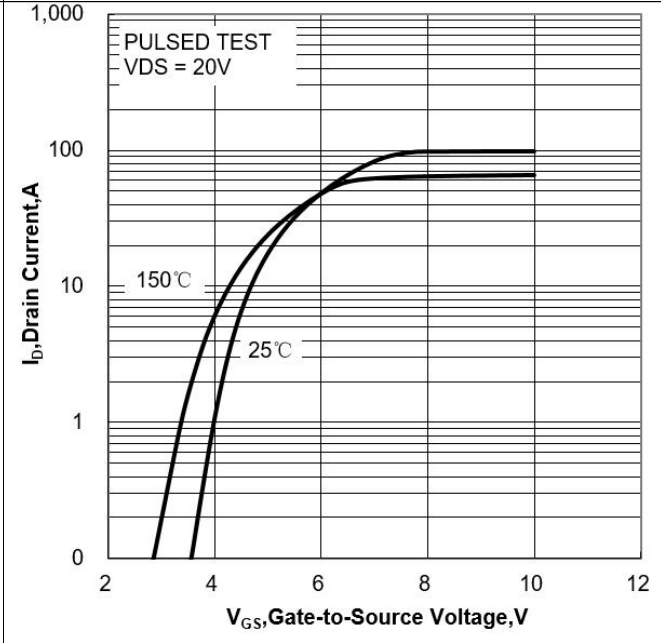


Figure 6 Typical Drain to Source ON Resistance vs Drain Current

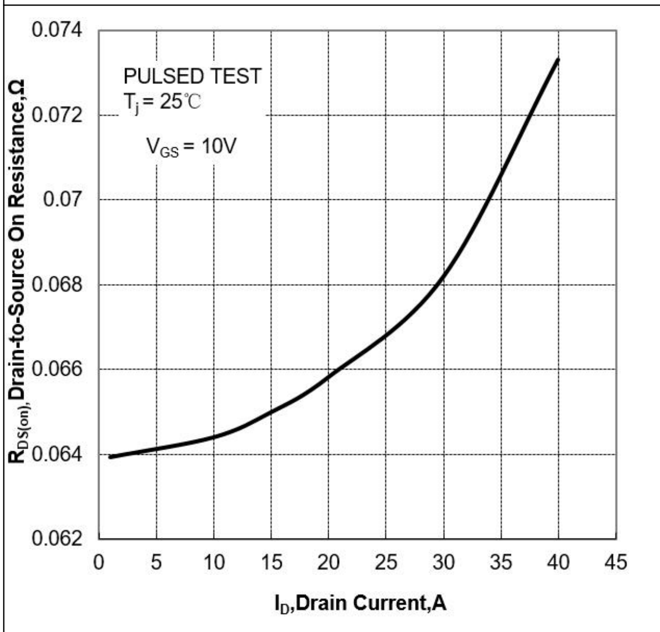


Figure 7 Typical Drian to Source on Resistance vs Junction Temperature

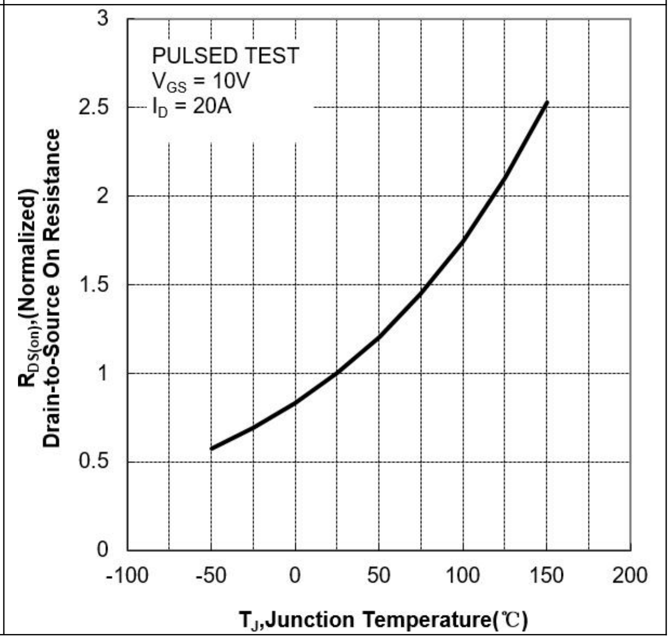


Figure 8 Typical Theshold Voltage vs Junction Temperature

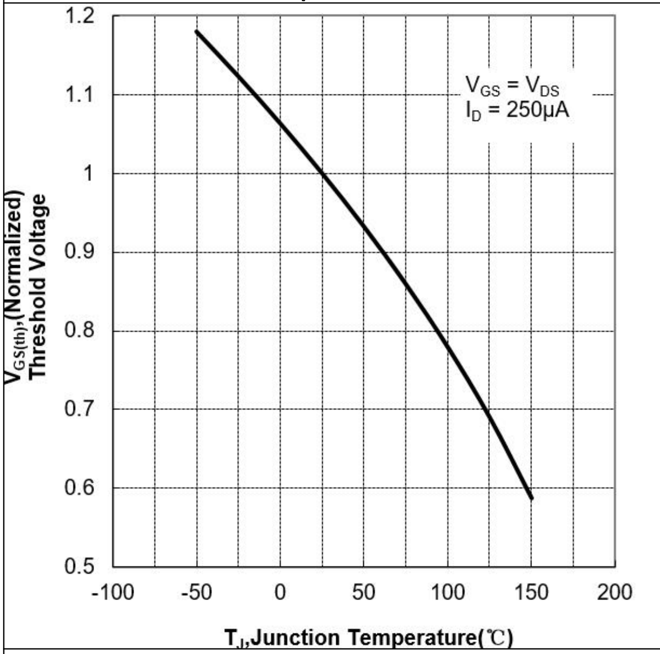


Figure 9 Typical Breakdown Voltage vs Junction Temperature

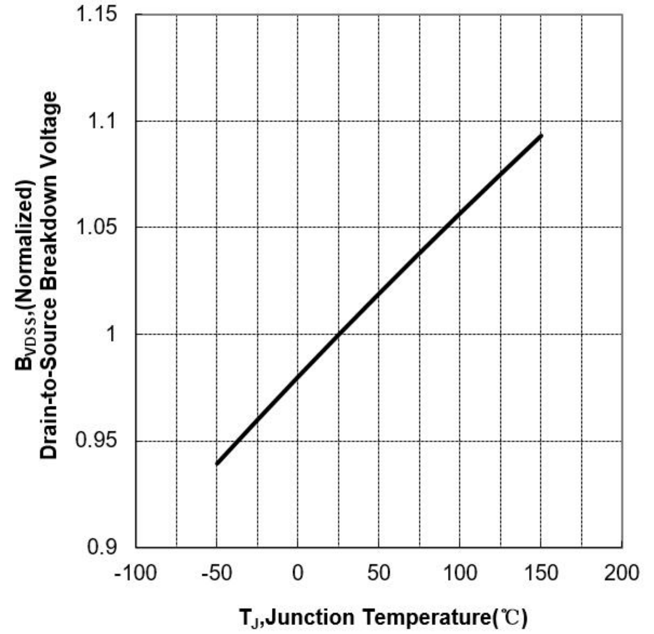


Figure 10 Typical Capacitance vs Drain to Source Voltage

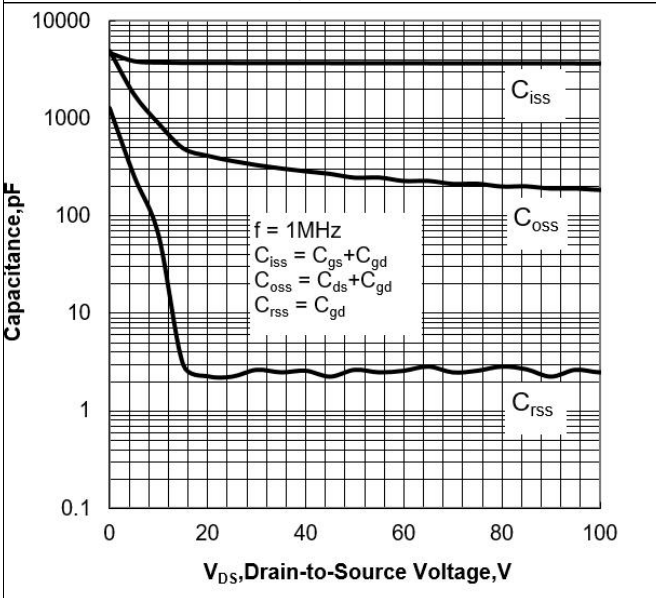
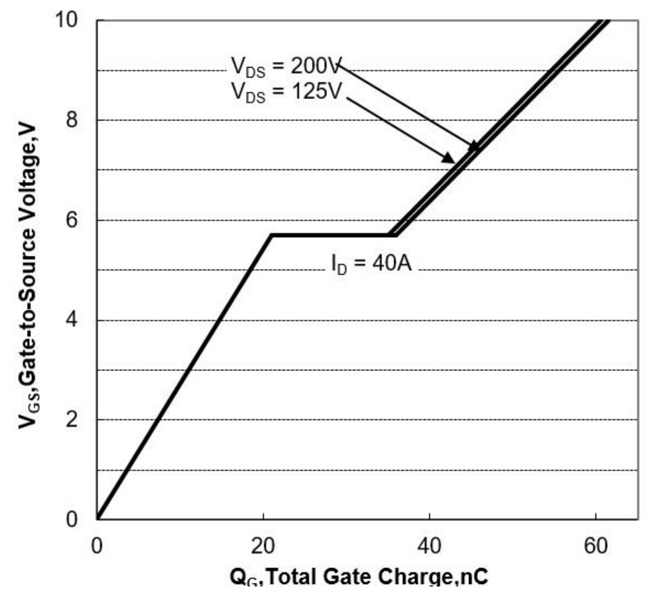
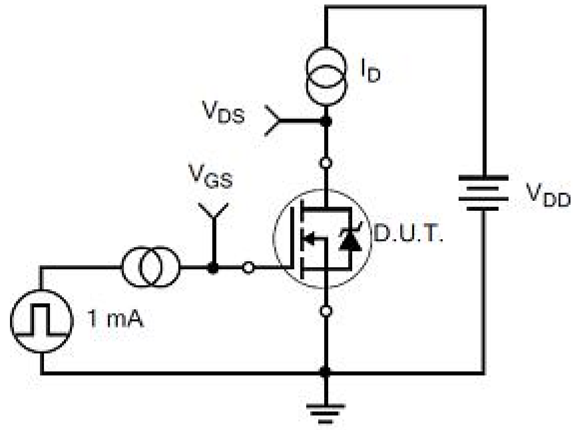


Figure 11 Typical Gate Charge vs Gate to Source Voltage

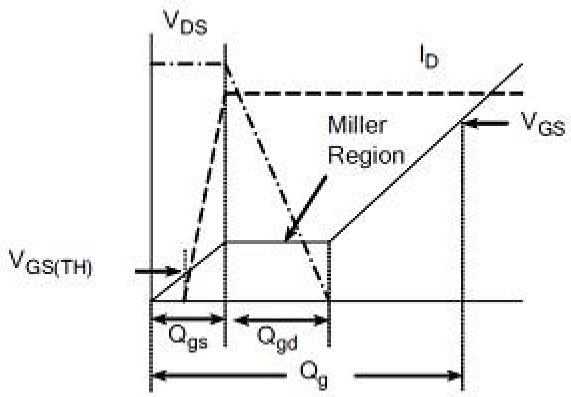


Test Circuit and Waveform

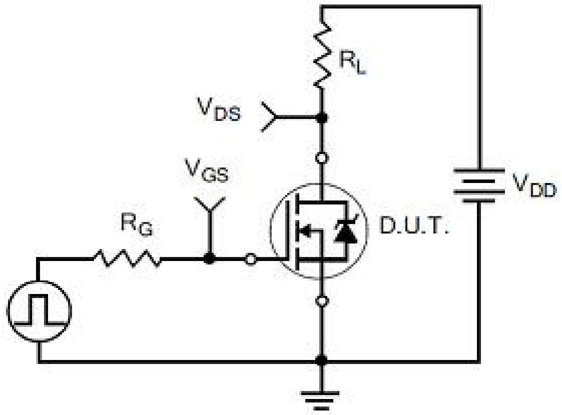
Gate Charge Test Circuit



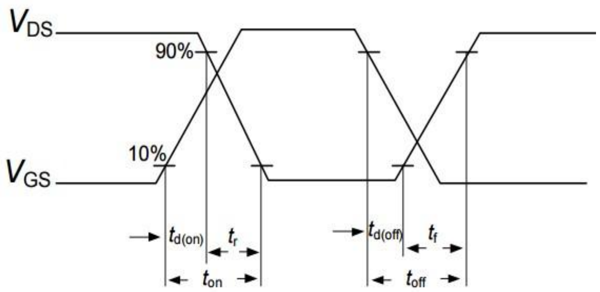
Gate Charge Waveforms



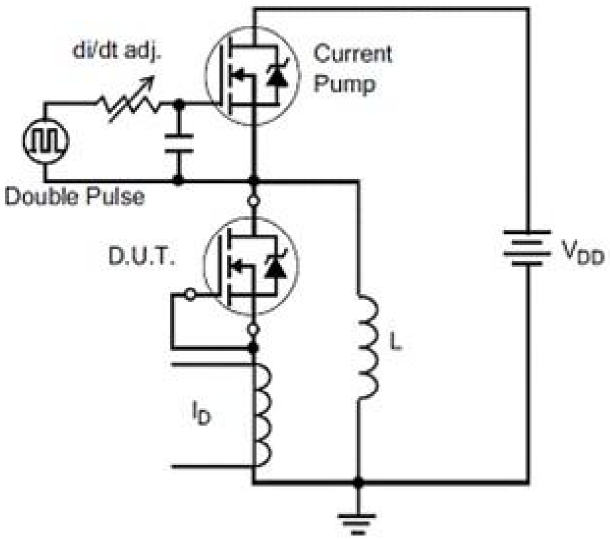
Resistive Switching Test Circuit



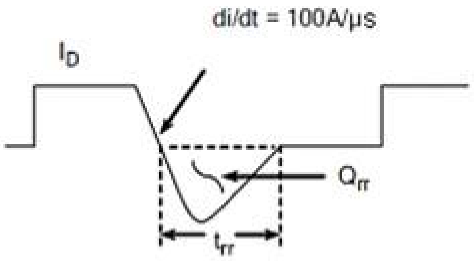
Resistive Switching Waveforms

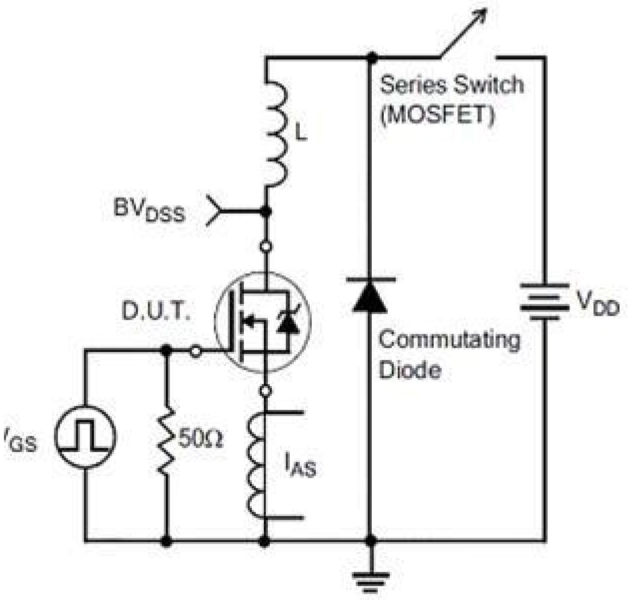
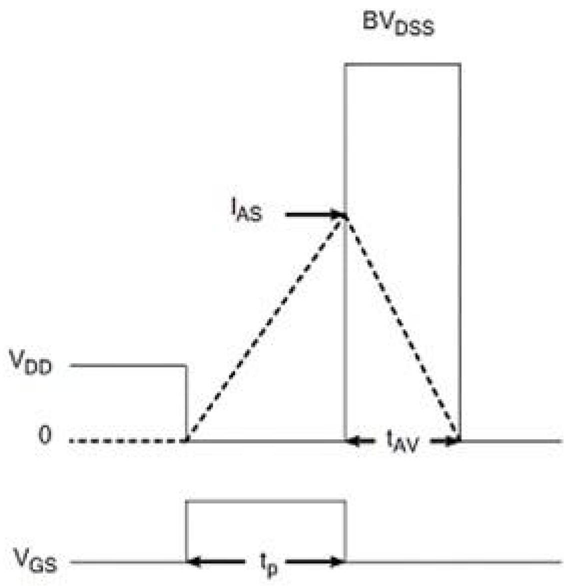


Diode Reverse Recovery Test Circuit

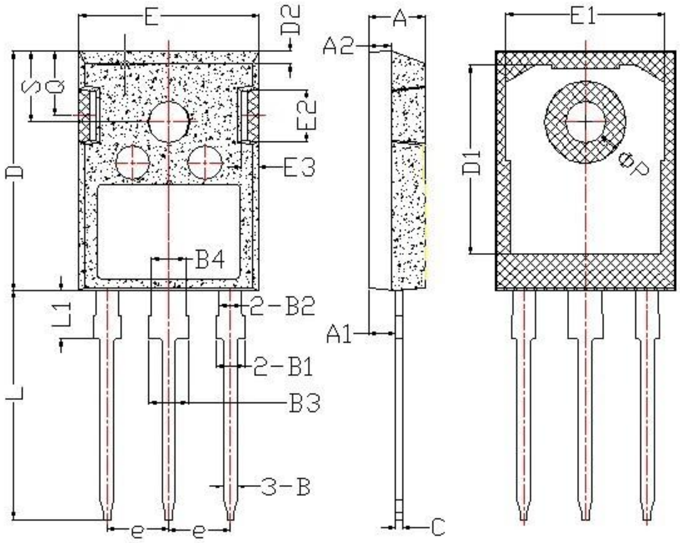


Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit	Unclamped Inductive Switching Waveform
	

Package Description



Items	Values(mm)	
	MIN	MAX
A	4.6	5.2
A1	2,2	2.6
B	0.9	1.4
B1	1.75	2.35
B2	1.75	2.15
B3	2.8	3.35
B4	2.8	3.15
C	0.5	0.7
D	20.60	21.30
D1	16	18
E	15.5	16.10
E1	13	14.7
E2	3.80	5.3
E3	0.8	2.60
e	5.2	5.7
L	19	20.5
L1	3.9	4.6
ΦP	2.5	3.70
Q	5.2	6.00
S	5.8	6.6

TO-247 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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