

Silicon N-Channel Power MOSFET

Description

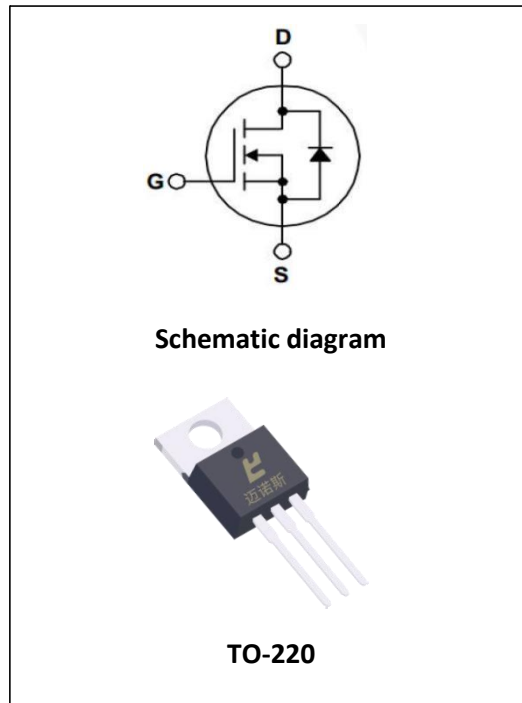
MPT04N10P, the N-channel Enhanced Power MOSFETs, is obtained by advanced double trench technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. This is suitable device for BMS and high current switching applications.

General Features

- ① $V_{DS}=100V$, $R_{dson}<4m\Omega$ @ $V_{GS}=10V$, $I_D=50A$ (Typ: $3.3m\Omega$)
- ② Low On-Resistance
- ③ Low Gate Charge
- ④ Low Reverse transfer capacitances
- ⑤ High avalanche ruggedness
- ⑥ RoHS product

Application

- ① BMS
- ② High current switching applications



Package Marking And Ordering Information:

Ordering Codes	Package	Product Code	Packing
MPT04N10P	TO-220	MPT04N10P	Tube

Absolute Maximum Ratings (at $T_C = 25^\circ C$, unless otherwise specified)

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current, Silicon Limited	172	A
	Continuous Drain Current, Package Limited	120	A
	Continuous Drain Current $T_C = 100^\circ C$, Silicon Limited	109.2	A
I_{DM}	Pulsed Drain Current (Note1)	480	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Avalanche Energy (Note2)	552	mJ
P_D	Power Dissipation	208	W
	Derating Factor above $25^\circ C$	1.67	W/ $^\circ C$
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ C$
T_L	Maximum Temperature for Soldering	260	$^\circ C$

Note1: Repetitive Rating: Pulse width limited by maximum junction temperature

Note2: $L=0.5mH$, $I_{as}=47A$, Start $T_J=25^\circ C$

Thermal characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	thermal resistance,Junction-to-Case	0.6	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	thermal resistance,Junction-to-Ambient	62.5	$^{\circ}\text{C}/\text{W}$

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

OFF Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
V_{DS}	Drain to Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	100	110	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=100\text{V}, V_{GS}=0\text{V}, T_j=25^{\circ}\text{C}$	--	--	1	μA
		$V_{DS}=80\text{V}, V_{GS}=0\text{V}, T_j=125^{\circ}\text{C}$	--	--	100	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+20\text{V}$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-20\text{V}$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On- Resistance	$V_{GS}=10\text{V}, I_D=50\text{A}(\text{Note4})$	--	3.3	4	m Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}(\text{Note4})$	2.0	3.0	4.0	V
Pulse width $t_p \leq 300\mu\text{s}, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$ $V_{DS}=50\text{V}$ $f=1.0\text{MHz}$	--	6600	--	PF
C_{oss}	Output Capacitance		--	1594	--	
C_{rss}	Reverse Transfer Capacitance		--	150	--	
Q_g	Total Gate Charge	$I_D=50\text{A}$ $V_{DD}=50\text{V}$ $V_{GS}=10\text{V}$	--	114	--	nC
Q_{gs}	Gate to Source Charge		--	27	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	24.5	--	

Switching Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD} = 50V$ $V_{GS} = 10V$ $R_G = 3\Omega$ Resistive Load	--	28	--	ns
t_r	Rise Time		--	27	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	59	--	
t_f	Fall Time		--	30	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current	$T_C = 25^\circ C$	--	--	120	A
I_{SM}	Maximum Pulsed Current		--	--	480	A
V_{SD}	Diode Forward Voltage	$I_S = 50A, V_{GS} = 0V$ (Note4)	--	--	1.2	V
T_{rr}	Reverse Recovery Time	$I_S = 65A,$ $T_j = 25^\circ C$ $dI_F/dt = 150A/\mu s,$ $V_{GS} = 0V$	--	70	--	ns
Q_{rr}	Reverse Recovery Charge		--	237	--	nC

Characteristics Curves

Figure 1. Safe Operating Area

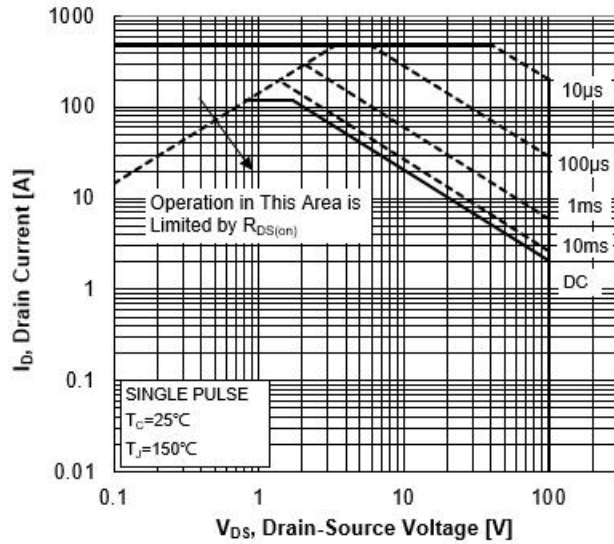


Figure 2. Maximum Power Dissipation vs Case Temperature

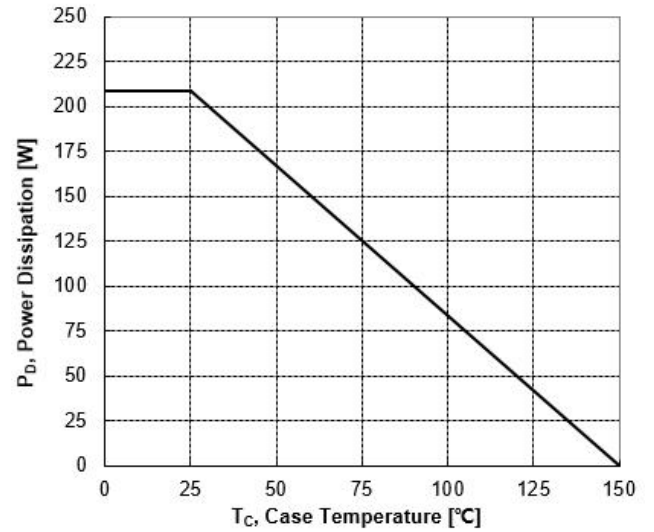


Figure 3. Maximum Continuous Drain Current vs Case Temperature

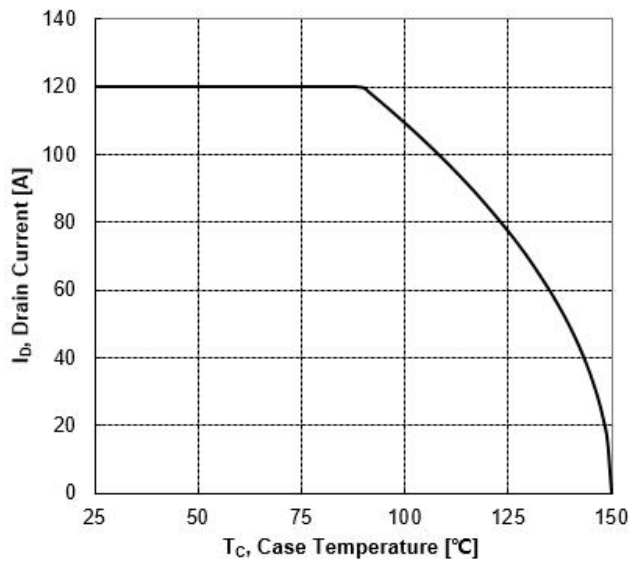


Figure 4. Typical Output Characteristics

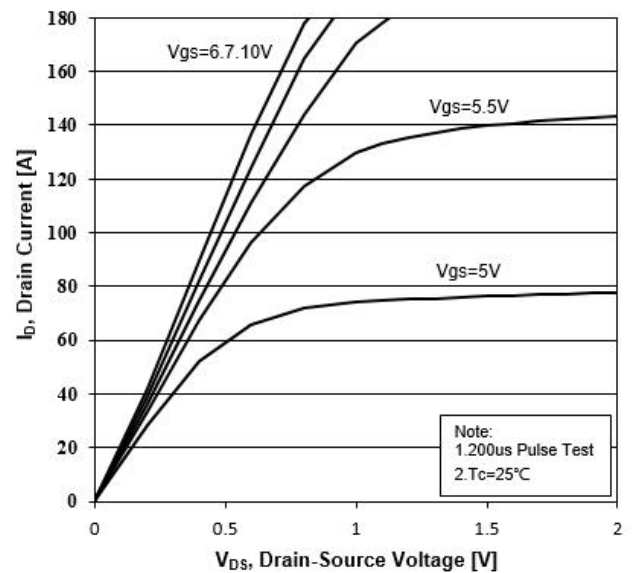


Figure 5. Transient Thermal Impedance

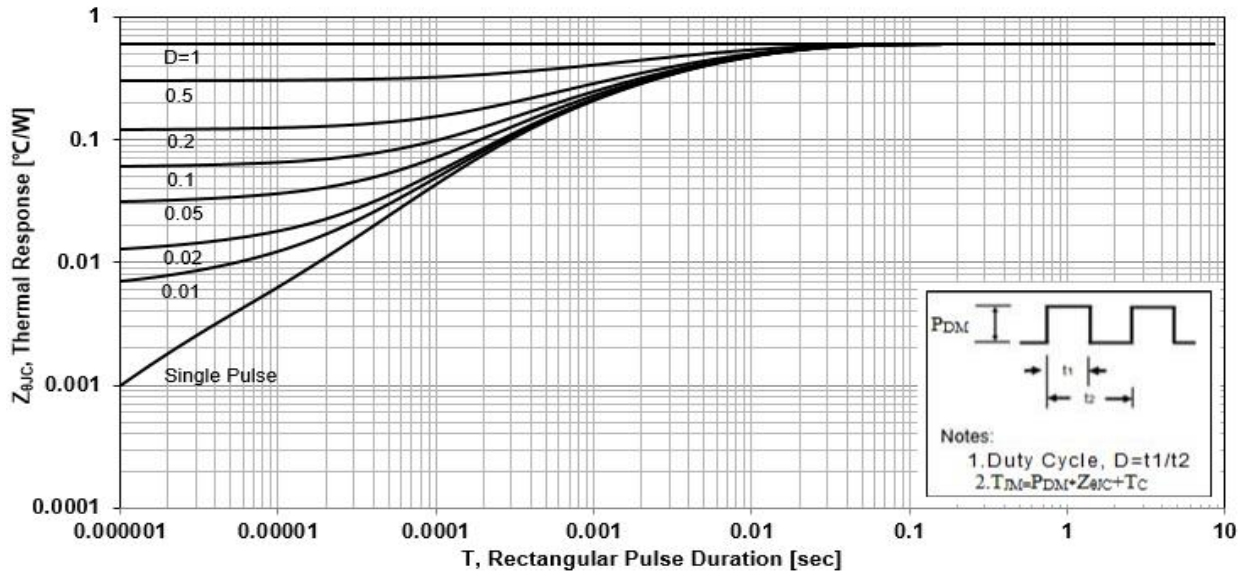


Figure 6. Typical Transfer Characteristics

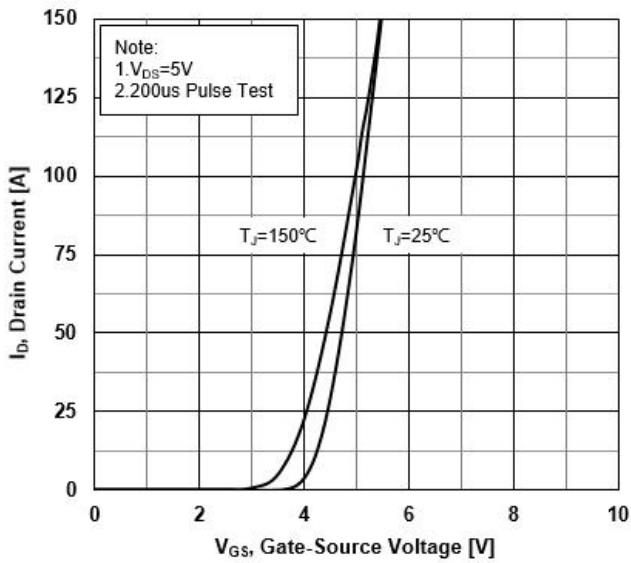


Figure 7. Source-Drain Diode Forward Characteristics

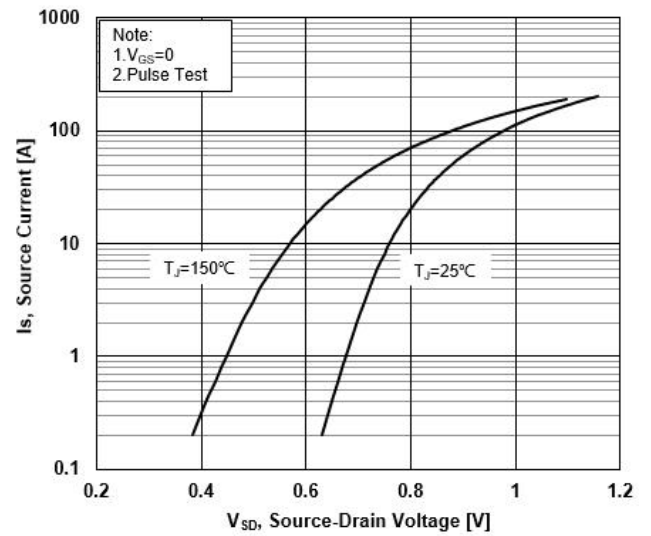


Figure 8. Drain-Source On-Resistance vs Drain Current

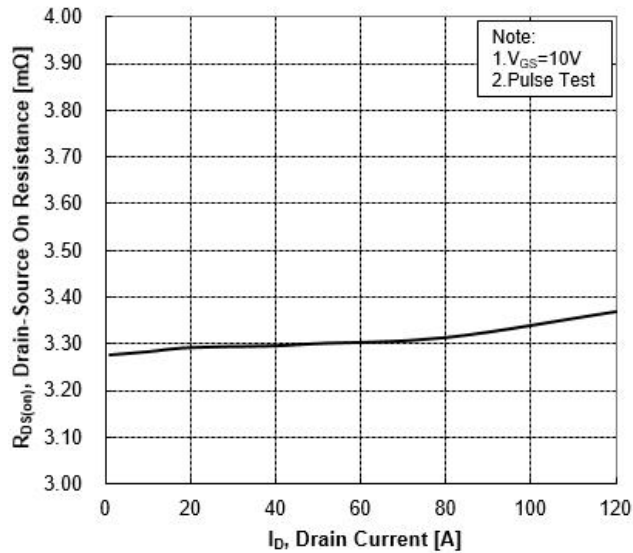


Figure 9. Normalized On-Resistance vs Junction Temperature

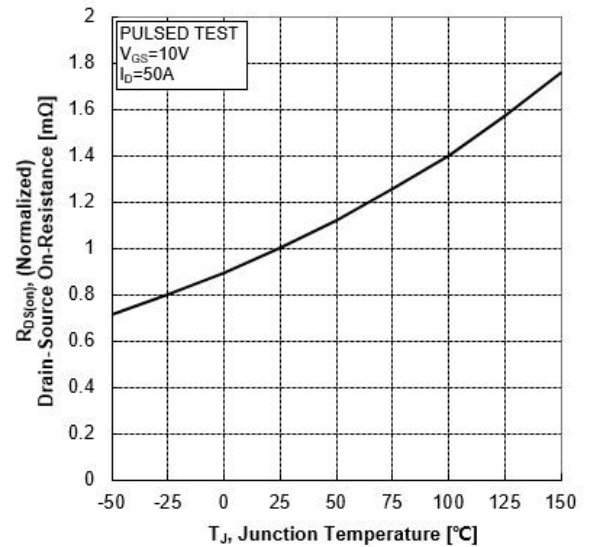


Figure 10. Normalized Threshold Voltage vs Junction Temperature

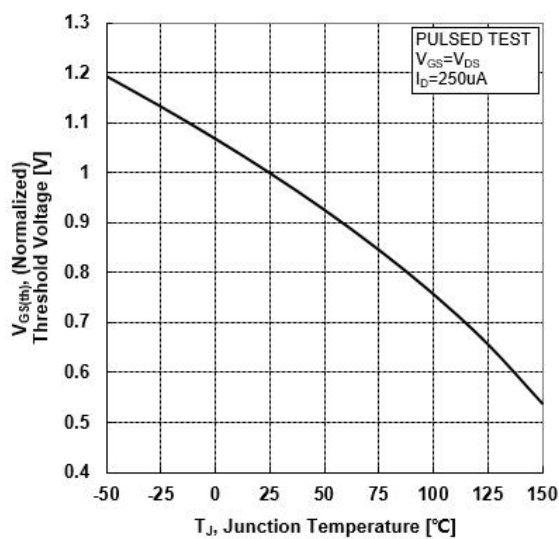


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

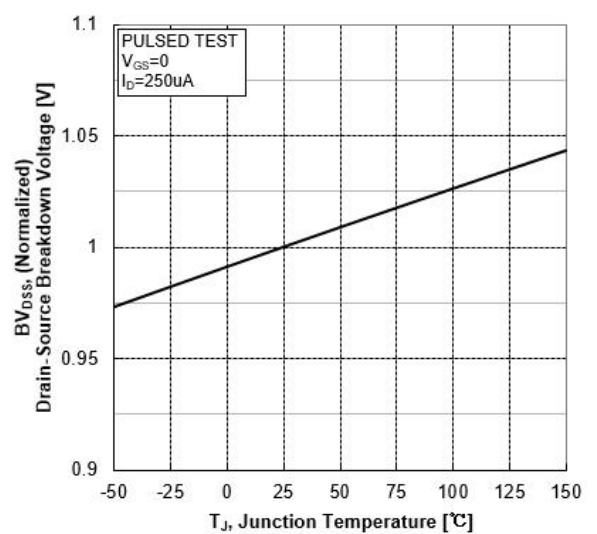


Figure 12. Capacitance Characteristics

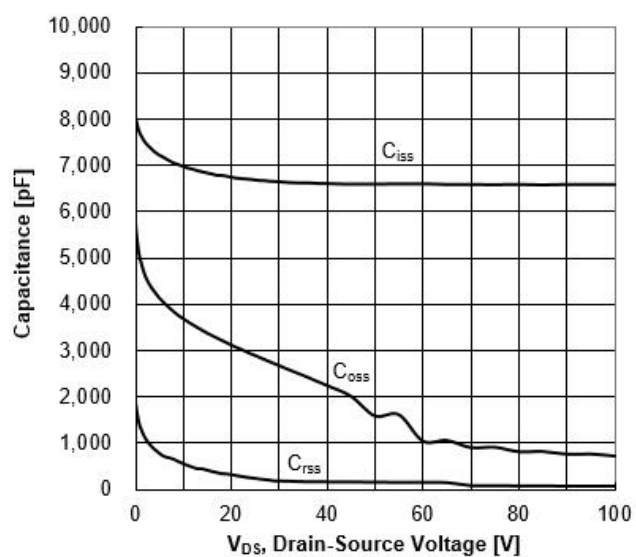
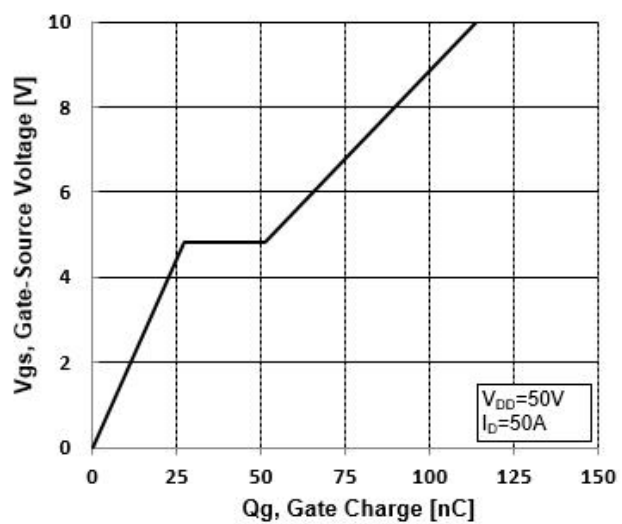
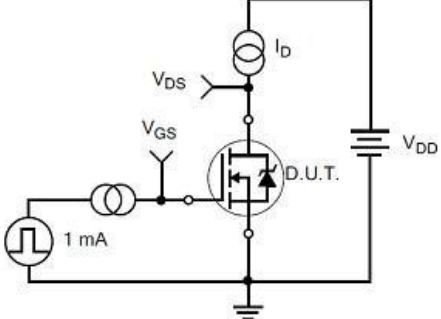
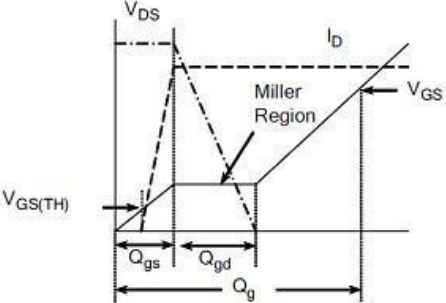
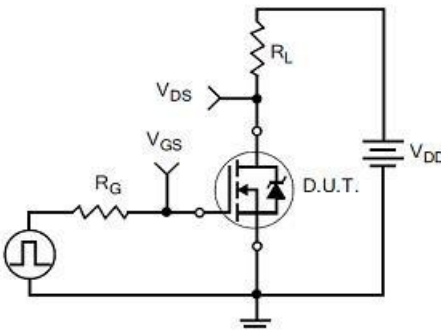
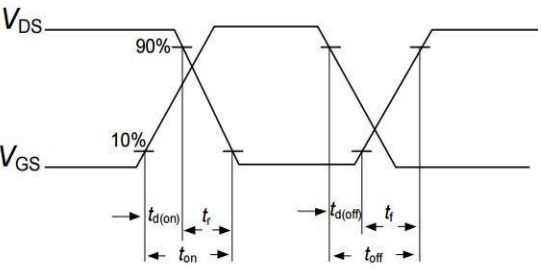
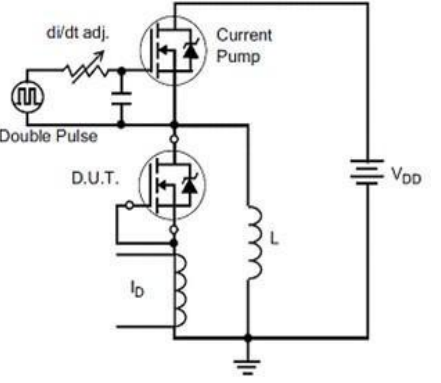
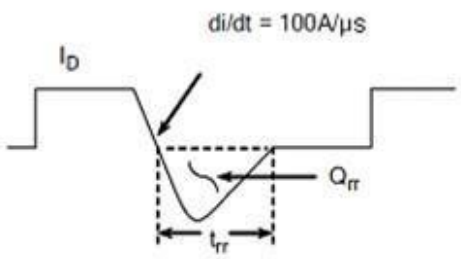
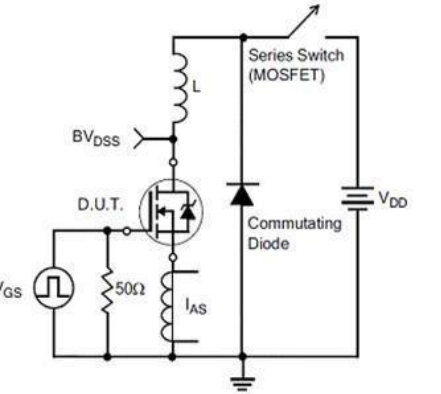
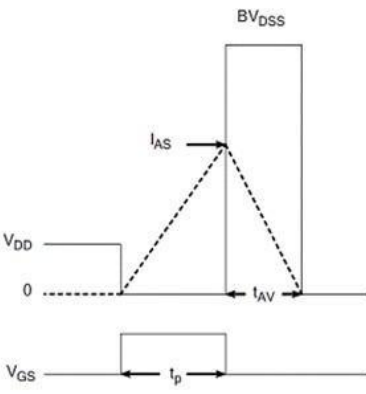


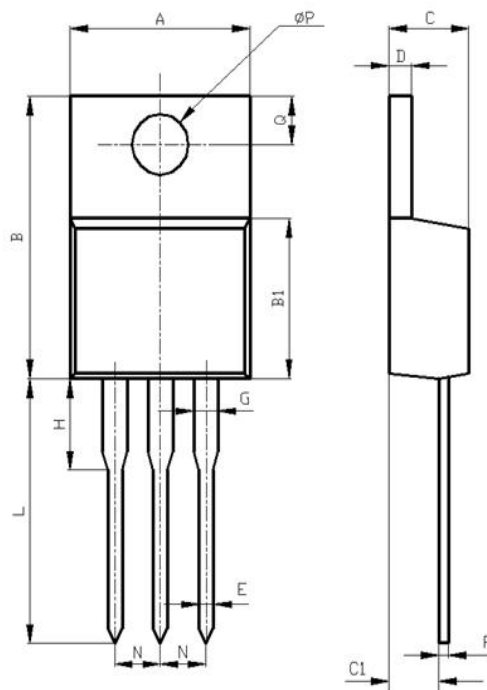
Figure 13. Typical Gate Charge vs Gate-Source Voltage



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



Symbol	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



迈诺斯科技

MPT04N10P

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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