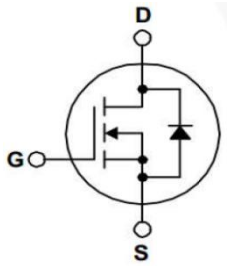
迈诺斯科技

MPT042N10P

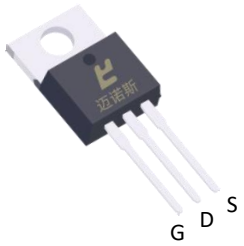
Silicon N-Channel Power MOSFET

Description

MPT042N10P, 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 motor drivers and high speed switching applications.



Schematic diagram



TO-220

General Features

① V_{DS}=100V, R_{dson}<3.8mΩ @V_{GS}=10V (Typ:3.4mΩ)
② Fast Switching
③ Low On-Resistance
④ Low Gate Charge
⑤ Low Reverse transfer capacitance
⑥ High avalanche ruggedness
⑦ RoHS product

Application

① Motor drivers
② Switching applications

Package Marking And Ordering Information：

Ordering Codes	Package	Product Code	Packing
MPT042N10-P	TO-220	MPT042N10P	Tube

Absolute Maximum Ratings (at T_C = 25°C, unless otherwise specified)

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current,Silicon Limited	180	A
	Continuous Drain Current,Package Limited	120	A
	Continuous Drain Current T_C = 100°C,Silicon Limited	128	A
I_{DM}	Pulsed Drain Current(Note1)	720	A
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Avalanche Energy(Note2)	520	mJ
P_D	Power Dissipation	227.2	W
	Derating Factor above 25°C	1.82	W/℃
T_J， T_{stg}	Operating Junction and Storage Temperature Range	150，–55 to 150	℃
T_L	Maximum Temperature for Soldering	260	℃

Note1： Repetitive Rating： Pulse width limited by maximum junction temperature
Note2： L=0.5mH, Ias=35A, Start TJ =25℃

Thermal characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	thermal resistance,Junction-to-Case	0.55	℃/W
$R_{\theta JA}$	thermal resistance,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	100	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} =100V, V_{GS}= 0V, T_j= 25℃	--	--	1	μA
		V_{DS} =80V, V_{GS}= 0V, T_j = 125℃	--	--	100	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+20V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-20V	--	--	-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=50A(Note4)	--	3.4	3.8	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D= 250μA(Note4)	2.0	3.0	4.0	V

Pulse width tp≤300μs, δ≤2%

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 50V f = 1.0MHz	--	7102	--	PF
C_{oss}	Output Capacitance		--	2584	--	
C_{rss}	Reverse Transfer Capacitance		--	174	--	
Q_g	Total Gate Charge	I_D =50A V_{DD} =50V V_{GS} = 10V	--	102	--	nC
Q_{gs}	Gate to Source Charge		--	30	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	19.6	--	

Switching Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Values**			**Units**
			Min.	**Typ.**	**Max.**	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD} = 50V I_D=50A V_{GS} = 10V R_G =3Ω Resistive Load	--	29	--	ns
t_r	Rise Time		--	33	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	48	--	
t_f	Fall Time		--	26	--	

Source-Drain Diode Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Values**			**Units**
			Min.	**Typ.**	**Max.**	
I_S	Continuous Source Current	T_C=25 °C	--	--	120	A
I_{SM}	Maximum Pulsed Current		--	--	720	A
V_{SD}	Diode Forward Voltage	I_S=50A, V_{GS}=0V(Note4)	--	--	1.2	V
T_{rr}	Reverse Recovery Time	I_S=50A, T_j = 25°C dIF/dt=100A/us, V_{GS}=0V	--	80	--	ns
Q_{rr}	Reverse Recovery Charge		--	189	--	nC

Characteristics Curves

Figure 1. Safe Operating Area

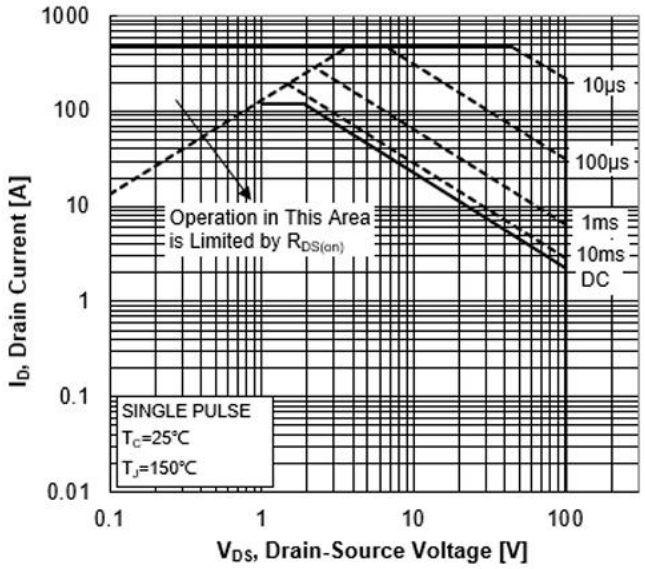


Figure 2. Maximum Power Dissipation vs Case Temperature

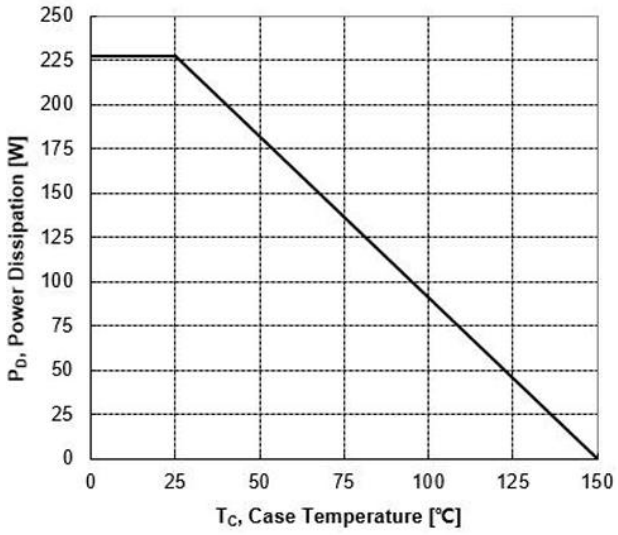


Figure 3. Maximum Continuous Drain Current vs Case Temperature

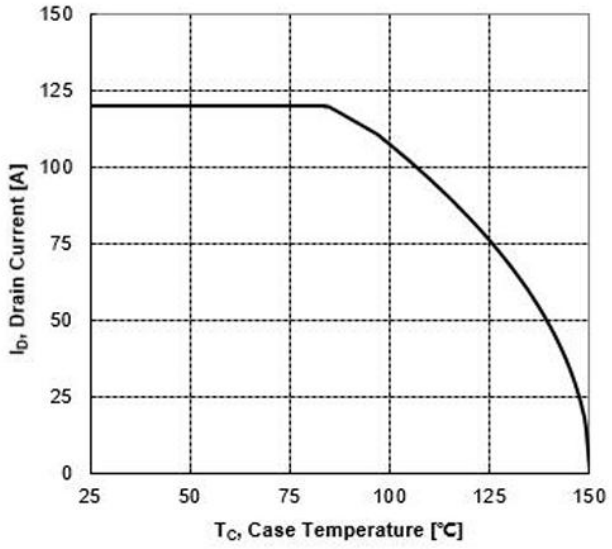


Figure 4. Typical Output Characteristics

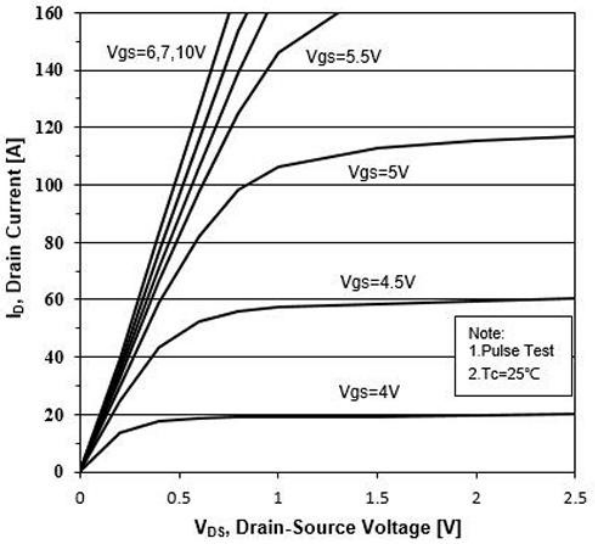


Figure 5. Transient Thermal Impedance

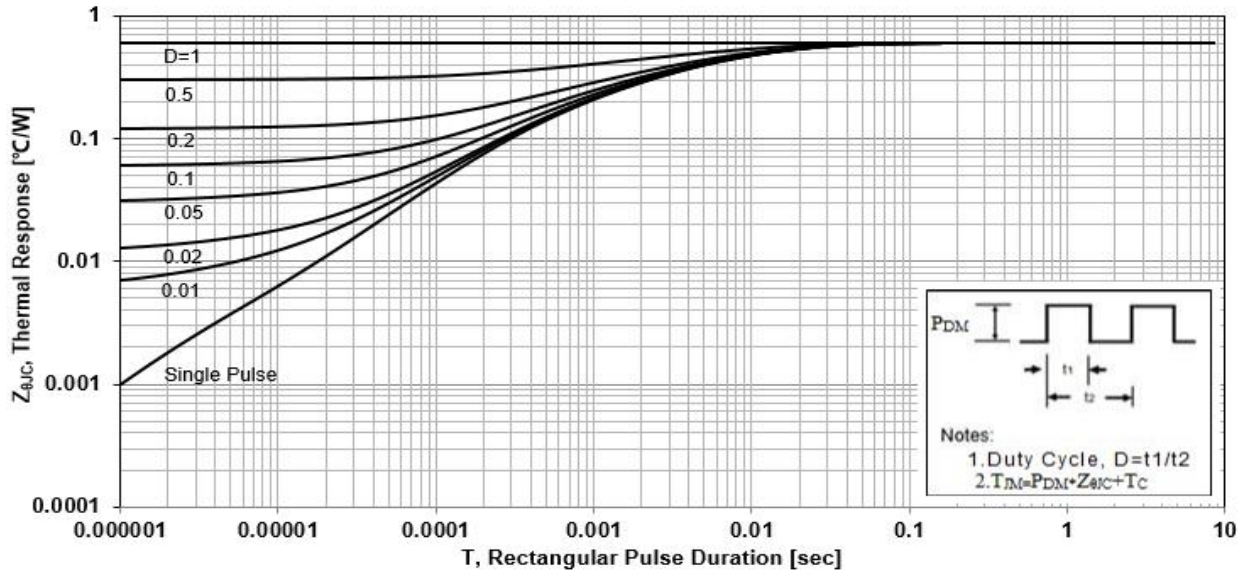


Figure 6. Typical Transfer Characteristics

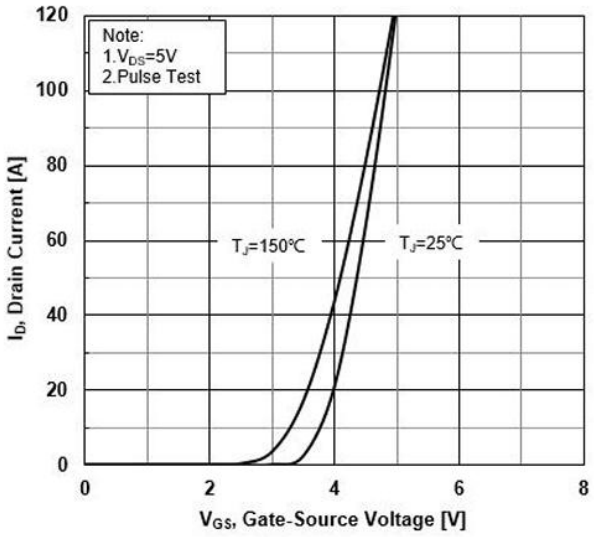


Figure 7. Source-Drain Diode Forward Characteristics

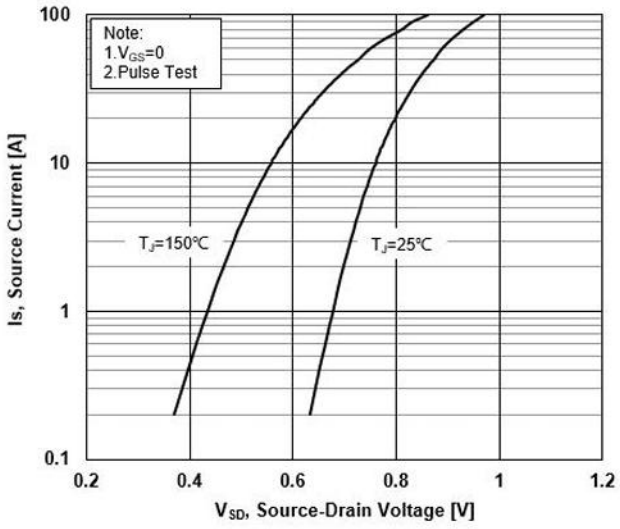


Figure 8. Drain-Source On-Resistance vs Drain Current

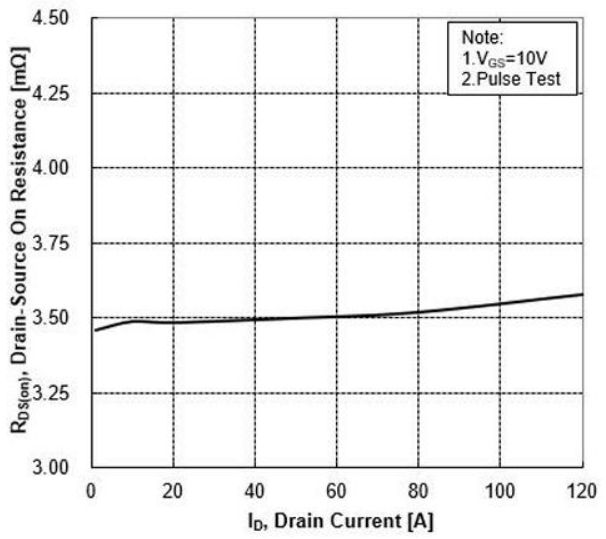


Figure 9. Normalized On-Resistance vs Junction Temperature

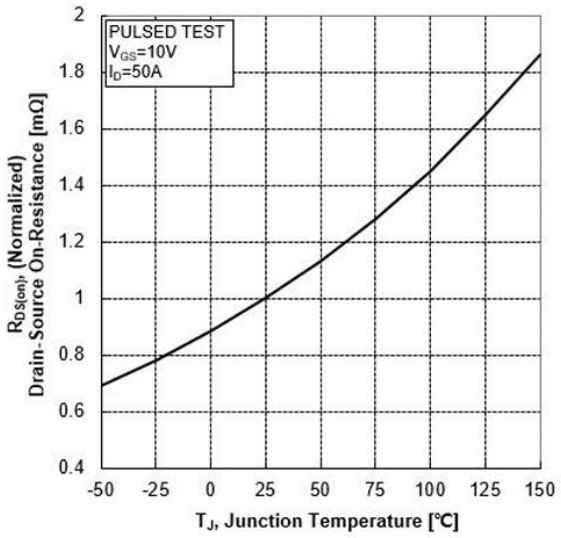


Figure 10. Normalized Threshold Voltage vs Junction Temperature

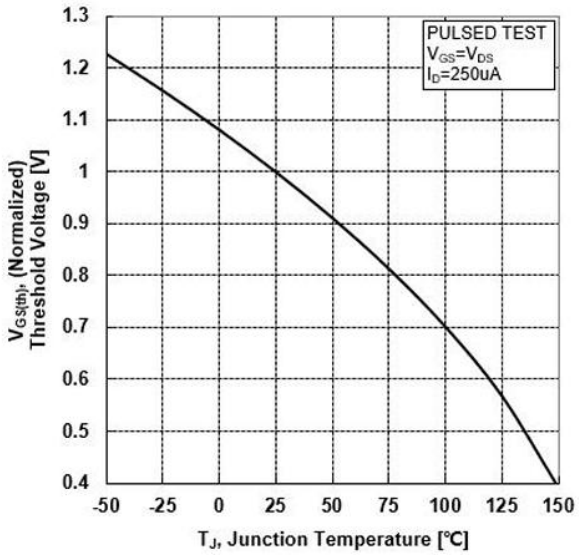


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

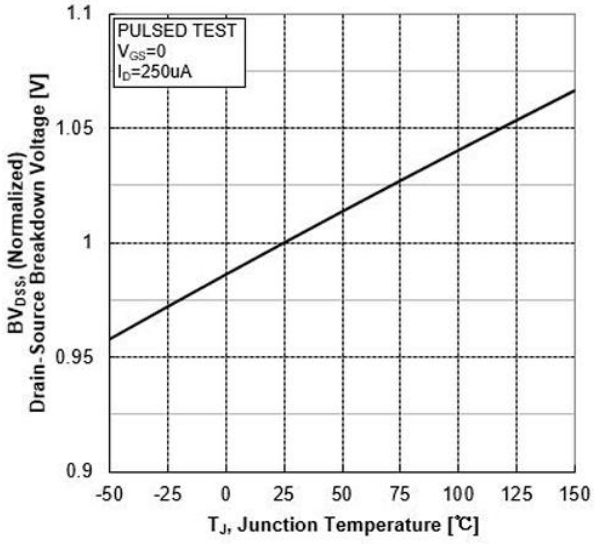
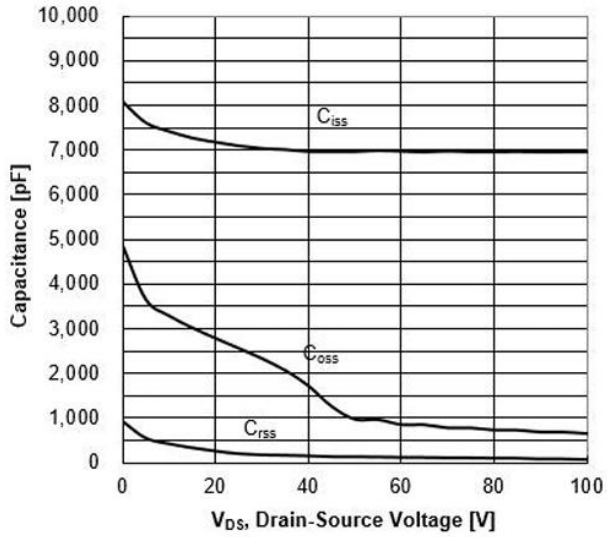
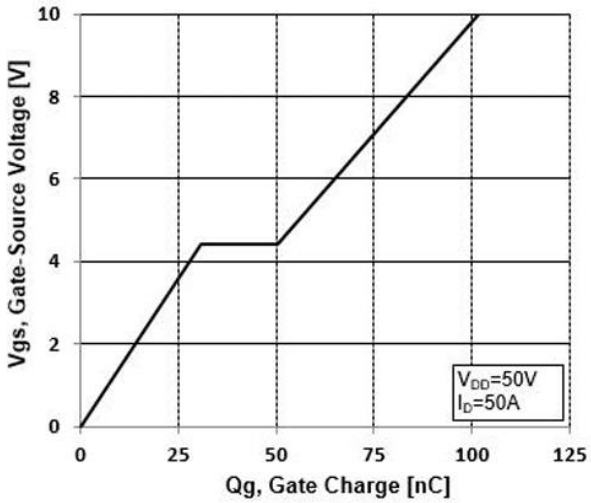
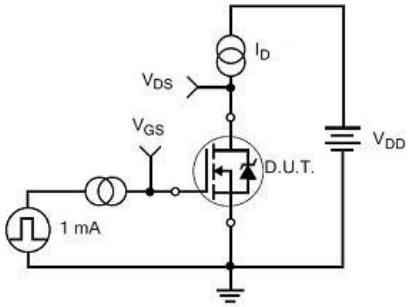
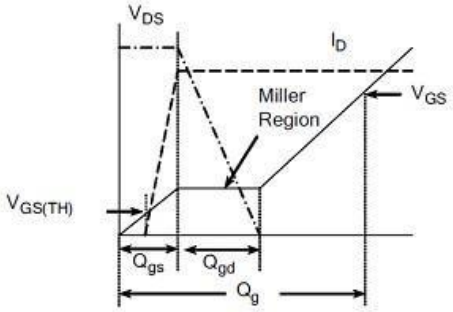
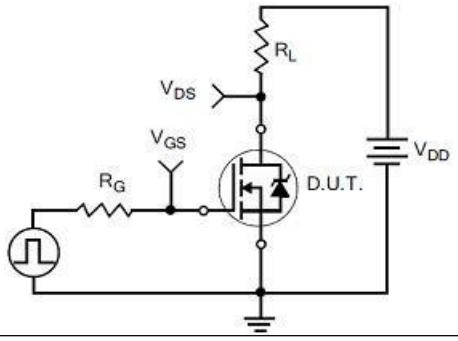
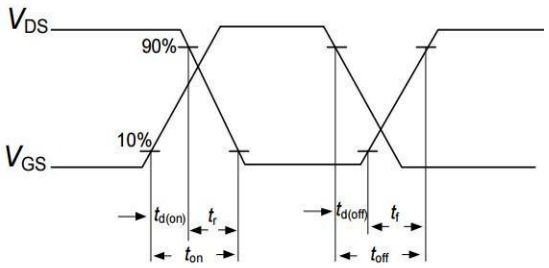
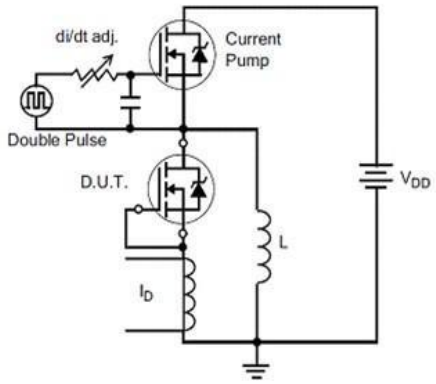
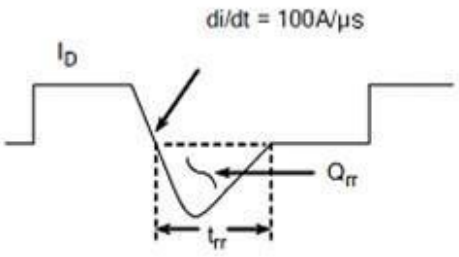
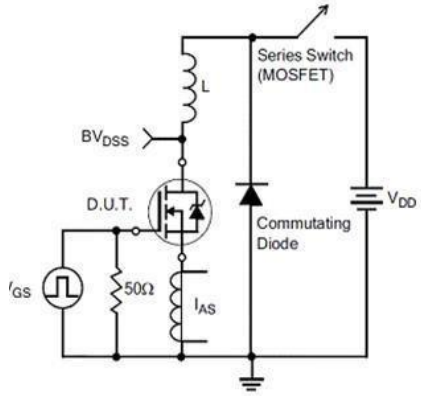
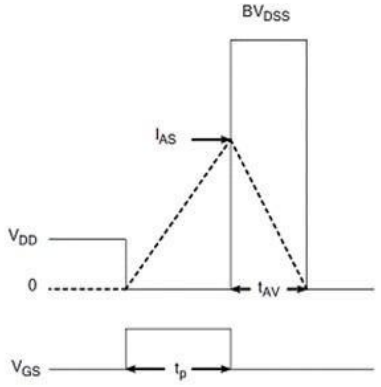
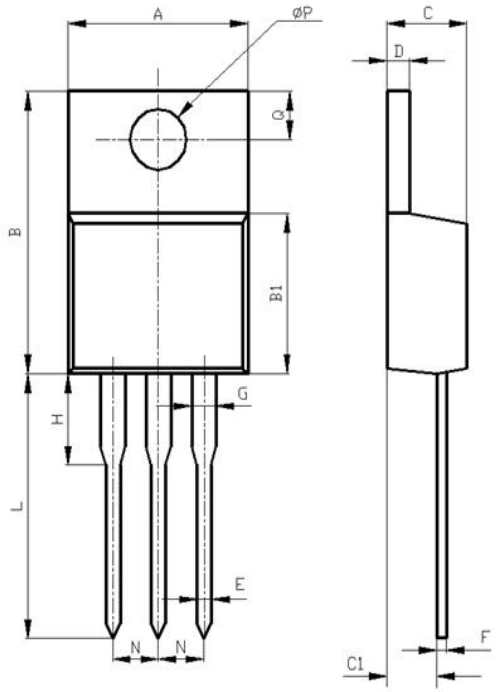


Figure 12. Capacitance Characteristics	Figure 13. Typical Gate Charge vs Gate-Source Voltage
	

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
ΦP	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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