Silicon   N-Channel   Power   MOSFET ®

CS120N08 A8

V_{DSS}	85	V
I_D（Silicon limited current）	120	A
$P_D(T_C=25℃)$	208	W
$R_{DS(ON)Typ}$	6	mΩ

General Description：

CS120N08 A8, the silicon N-channel Enhanced VDMOSFETs, is obtained by advanced Trench Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220AB, which accords with the RoHS standard.

TO-220AB

1. Gate 2. Drain 3. Source

Features：

- **Fast Switching**
- **Low ON Resistance(Rdson≤7.5mΩ)**
- **Low Gate Charge   (Typical Data:74.4nC)**
- **Low Reverse transfer capacitances(Typical:253pF)**
- **100% Single Pulse avalanche energy Test**

Inner Equivalent Principium Chart

Applications：

Power switch circuit of adaptor and charger.

Absolute（Tc= 25℃ unless otherwise specified）:

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	85	V
I_D	Continuous Drain Current	120	A
	Continuous Drain Current $T_C = 100$ ℃	85	A
I_{DM} a1	Pulsed Drain Current	480	A
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS} a2	Single Pulse Avalanche Energy	650.25	mJ
P_D	Power Dissipation	208	W
	Derating Factor above 25 ℃	1.6	W/℃
T_J，T_{stg}	Operating Junction and Storage Temperature Range	150，−55 to 150	℃
T_L	Maximum Temperature for Soldering	300	℃

Electrical Characteristics（Tc= 25℃ unless otherwise specified）：

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250 μA	85	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} =85V, V_{GS}= 0V, T_a = 25℃	--	--	1	μA
		V_{DS} =68V, V_{GS}= 0V, T_a = 100℃	--	--	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	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=10V,I_D=60A	--	6.0	7.5	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.0	--	4.0	V
Pulse width tp≤300 μs, δ ≤2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	VGS=0V， VDS=25V f=1.0MHz	--	4572	--	pF
C_{oss}	Output Capacitance		--	494.4	--	
C_{rss}	Reverse Transfer Capacitance		--	253	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	VGS=10V， RG=6Ω VDD=40V， ID=60A	--	35.7	--	ns
tr	Rise Time		--	65.6	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	67.2	--	
t_f	Fall Time		--	21.87	--	
Q_g	Total Gate Charge	VGS=10V， VDD=64V ID=60A	--	74.4	--	nC
Q_{gs}	Gate to Source Charge		--	21.9	--	
Q_{gd}	Gate to Drain ("Miller")Charge		--	22.4	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	120	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	480	A
V_{SD}	Diode Forward Voltage	I_S=60A,V_{GS}=0V	--	--	1.2	V
trr	Reverse Recovery Time	I_S=20A,T_j = 25℃ dI$_F$/dt=100A/us, V_{GS}=0V	--	72	--	ns
Qrr	Reverse Recovery Charge		--	126	--	nC
I_{RRM}	Reverse Recovery Current		--	3.5	--	A
Pulse width tp≤300μs, δ ≤2%						

Symbol	Parameter	Max.	Units
R$_{θJC}$	Junction-to-Case	0.6	℃/W
R$_{θJA}$	Junction-to-Ambient	48.92	℃/W

a1：Repetitive rating; pulse width limited by maximum junction temperature

a2：L=0.5mH, I_D=51A, Start T_J=25℃

Characteristics Curve：

Figure　1　Maximum Forward Bias 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　Drain-to-Source On Resistance vs Drain Current

Figure　6　Typical Transfer Characteristics
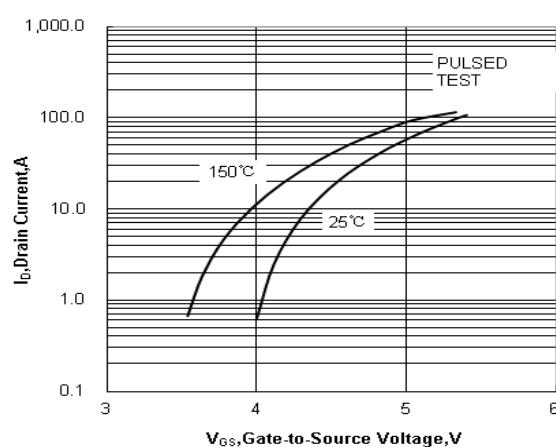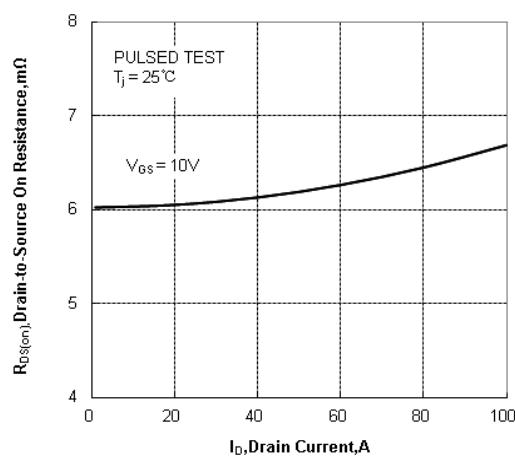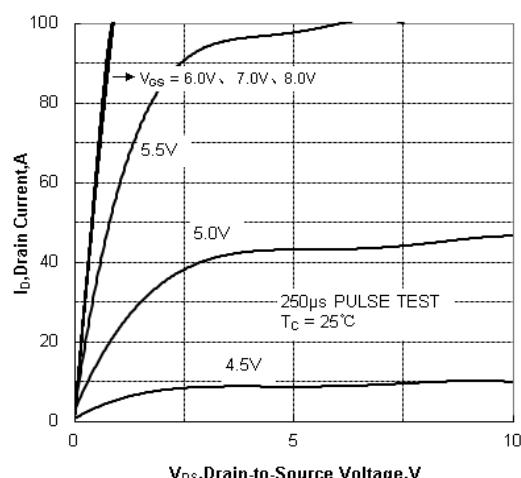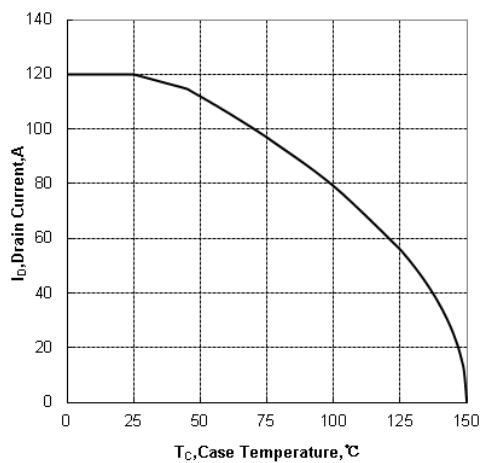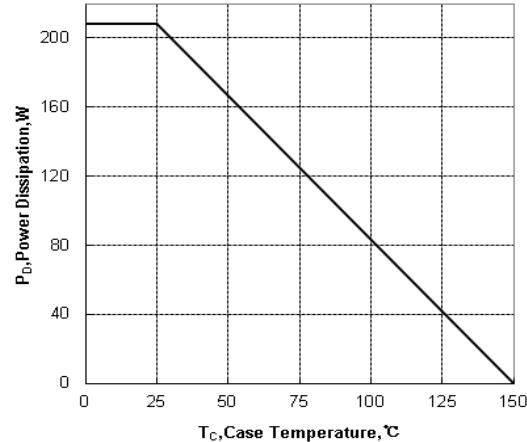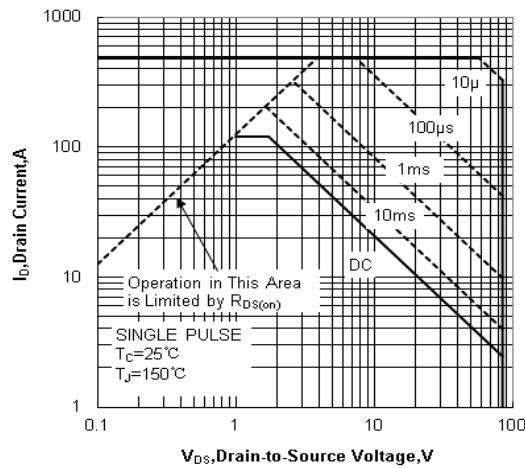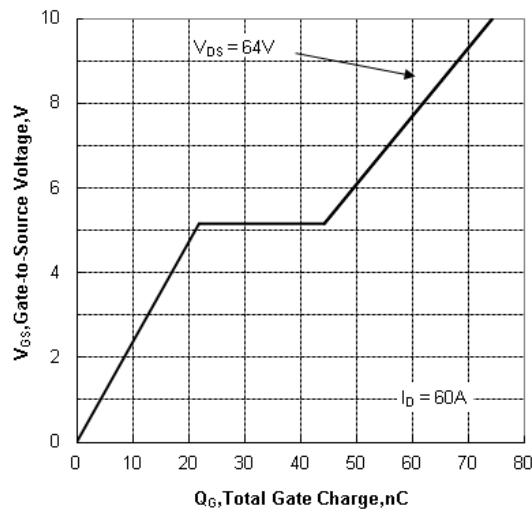
Figure 7 Typical Gate Charge vs Gate to Source Voltage
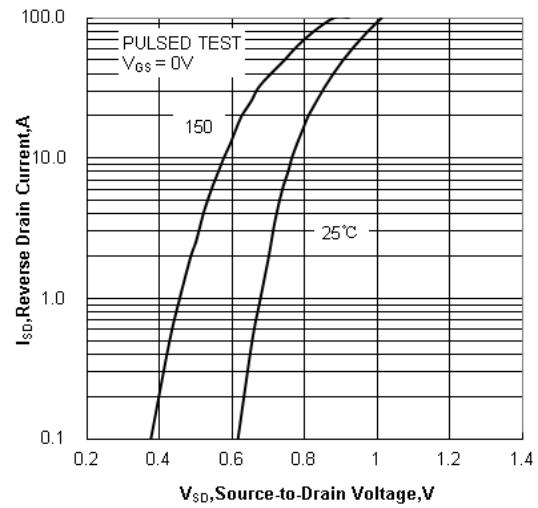

Figure 8 Typical Body Diode Transfer Characteristics
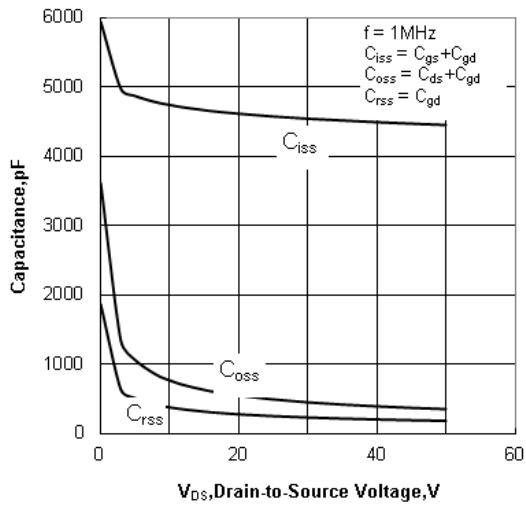
Figure 9 Typical Capacitance vs Drain to Source Voltage
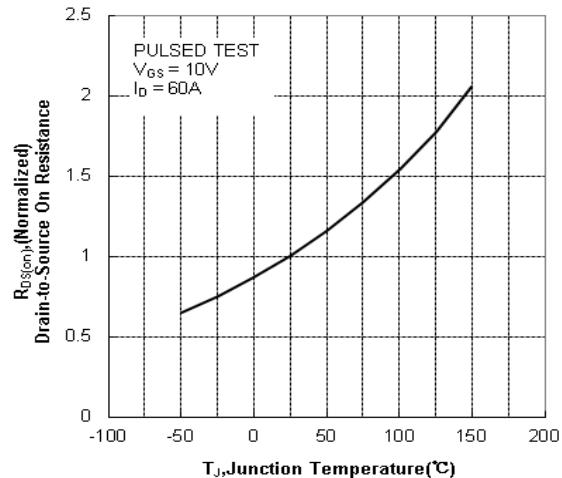
Figure 10 Typical Drian to Source on Resistance vs Junction Temperature
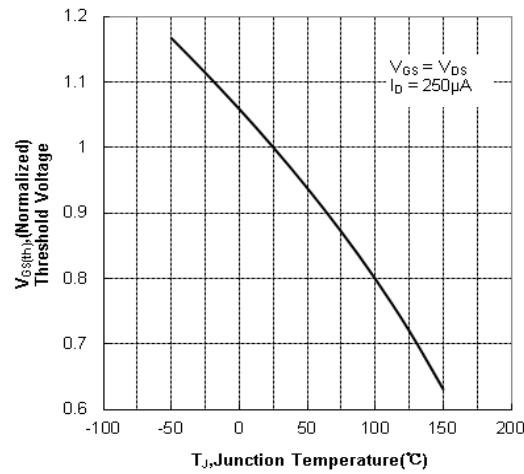
Figure 11 Typical Theshold Voltage vs Junction Temperature
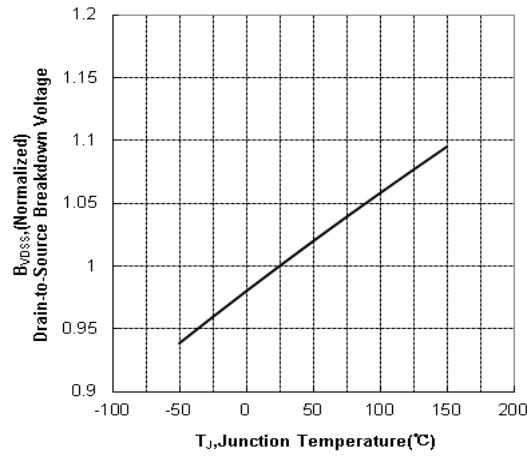
Figure 12 Typical Breakdown Voltage vs Junction Temperature
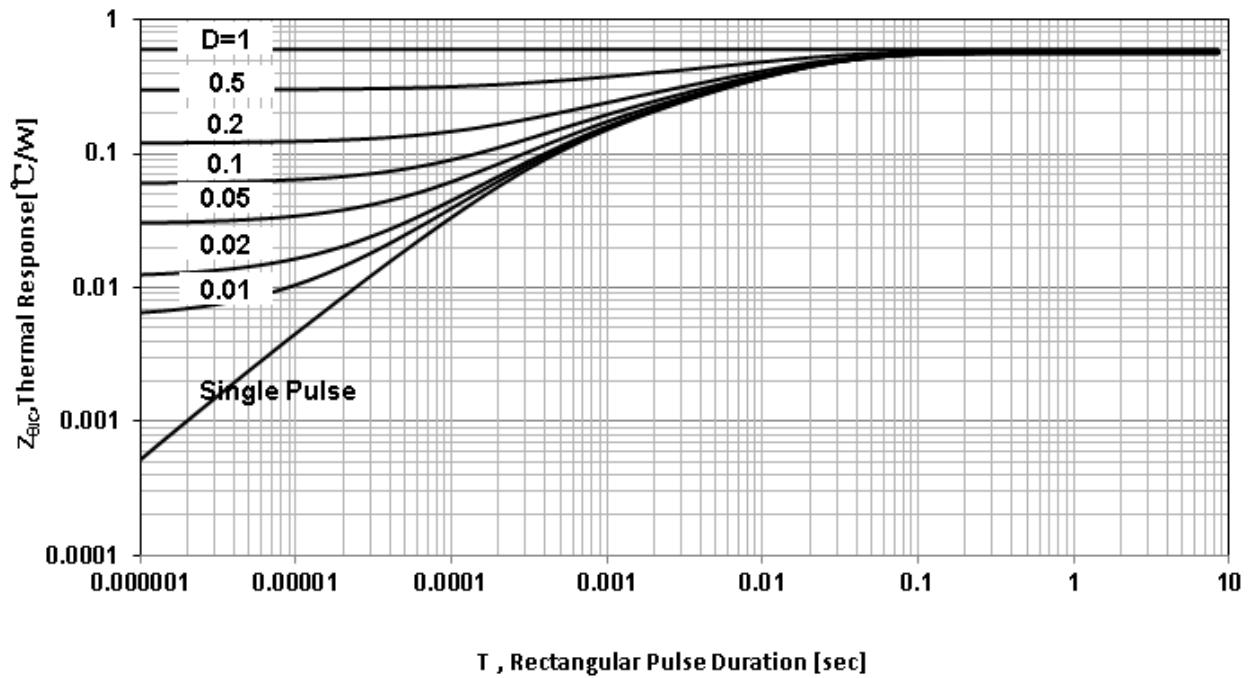
Figure 13 Maximum Effective Transient Thermal Impedance, Junction-to-Case

Test Circuit and Waveform
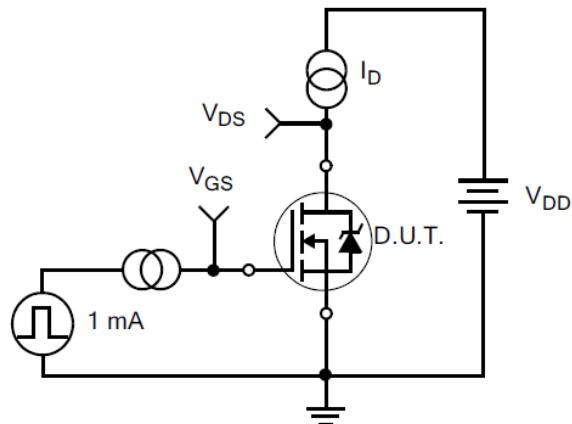
Figure 17. Gate Charge Test Circuit
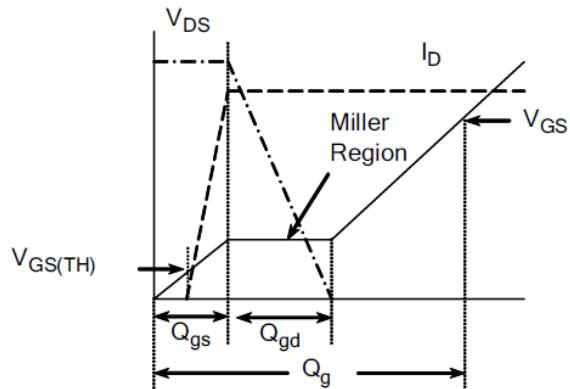

Figure 18. Gate Charge Waveform
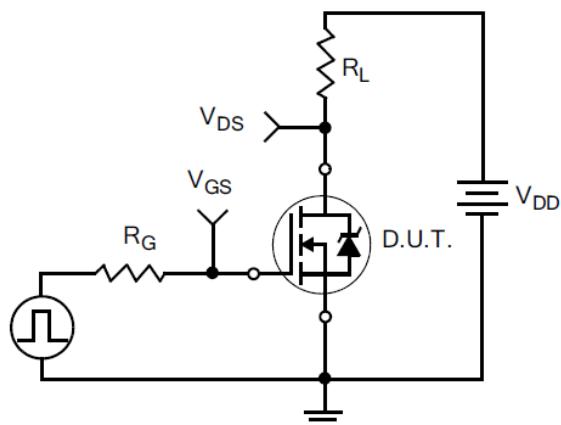
Figure 19. Resistive Switching Test Circuit
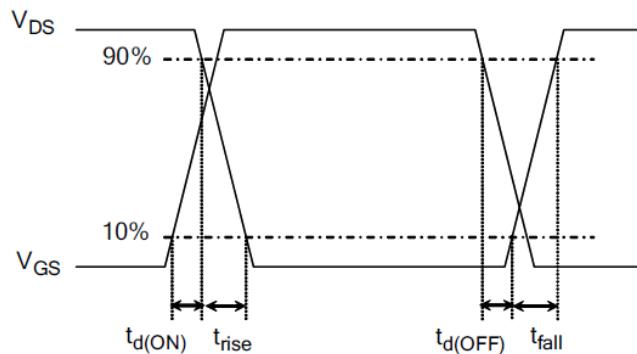
Figure 20. Resistive Switching Waveforms
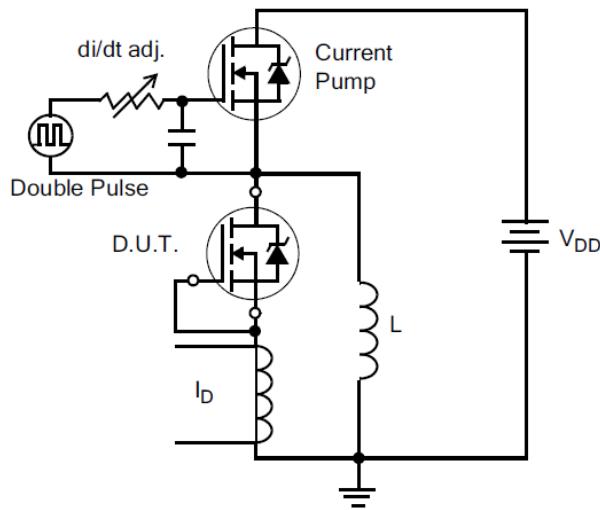
Figure 21. Diode Reverse Recovery Test Circuit
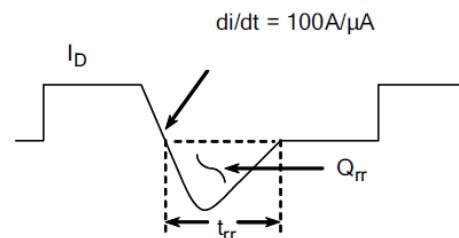
Figure 22. Diode Reverse Recovery Waveform
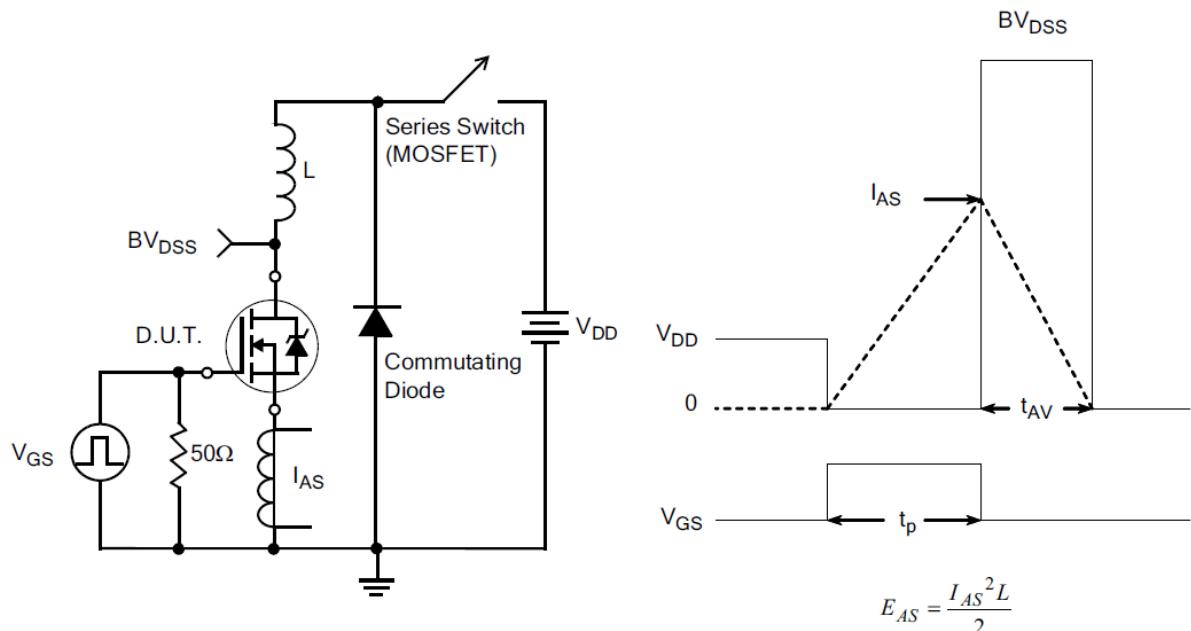
Figure 23. Unclamped Inductive Switching Test Circuit
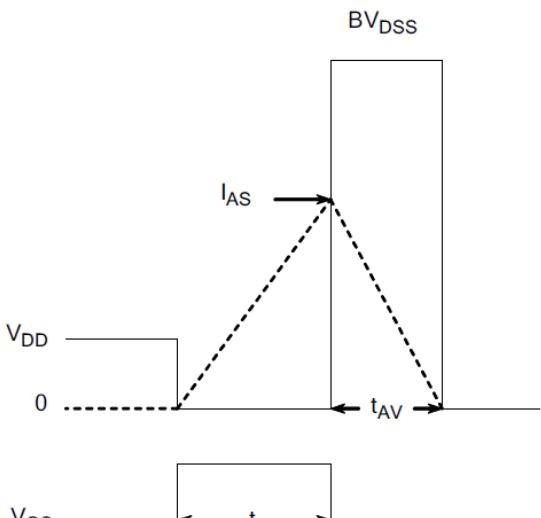
Figure 24. Unclamped Inductive Switching Waveforms

$$E_{AS} = \frac{I_{AS}{}^2 L}{2}$$

Package Information：
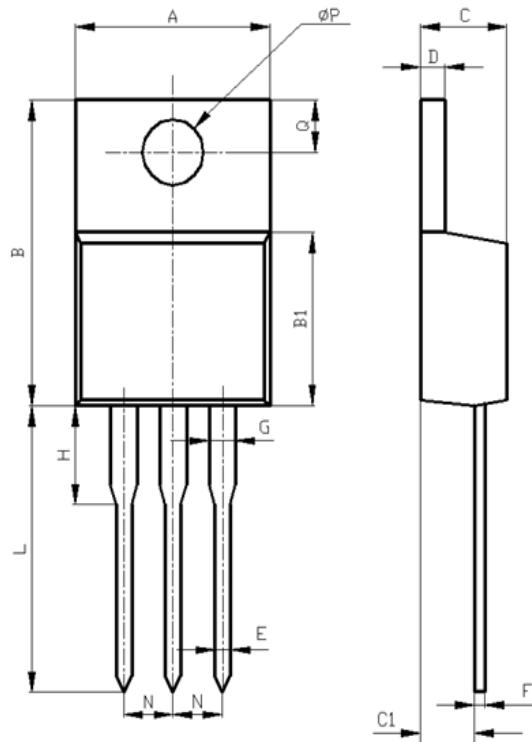
Items	Values(mm)	
	MIN	MAX
A	9.60	10.6
B	15.0	16.0
B1	8.90	9.50
C	4.30	4.80
C1	2.30	3.10
D	1.20	1.40
E	0.70	0.90
F	0.30	0.60
G	1.17	1.37
H	2.70	3.80
L*	12.6	14.8
N	2.34	2.74
Q	2.40	3.00
ΦP	3.50	3.90

*adjustable

TO-220AB Package

The name and content of poisonous and harmful material in products

	Hazardous Substance								
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE	DIBP	DEHP	DBP	BBP
Limit	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%
Lead Frame	○	○	○	○	○	○	○	○	○	○
Molding	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○	○	○	○	○
Solder	✕	○	○	○	○	○	○	○	○	○
Note	○：Means the hazardous material is under the criterion of 2011/65/EU. ✕：Means the hazardous material exceeds the criterion of 2011/65/EU. The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup's RoHS.									

Warnings

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. It is suggested to be used under 80 percent of the maximum ratings of the device.

2. When installing the heatsink, please pay attention to the torsional moment and the smoothness of the heatsink.

3. VDMOSFETs 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.

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