

General Description:

55N25, the silicon N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar 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-220F, which accords with the RoHS standard.

V_{DSS}	250	V
I_D	55	A
$P_D (T_C=25^\circ\text{C})$	50	W
$R_{DS(ON)Typ}$	56	m Ω

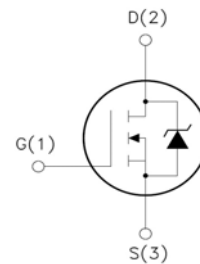
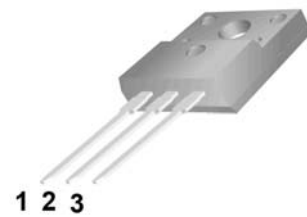
Features:

- Fast Switching
- Low ON Resistance
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications:

Power switch circuit of electron ballast and adaptor.

TO-220F



1. Gate (G)
2. Drain (D)
3. Source (S)

Absolute ($T_J = 25^\circ\text{C}$ unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	250	V
I_D	Continuous Drain Current $T_C = 25^\circ\text{C}$	55	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	35	A
I_{DM}^{a1}	Pulsed Drain Current $T_C = 25^\circ\text{C}$	220	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	2000	mJ
dv/dt^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation $T_C = 25^\circ\text{C}$	50	W
	Derating Factor above 25°C	0.4	W/ $^\circ\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	250	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A, \text{Reference } 25^\circ\text{C}$	--	0.30	--	V/ $^\circ\text{C}$
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=250V, V_{GS}=0V, T_J=25^\circ\text{C}$	--	--	1	μA
		$V_{DS}=200V, V_{GS}=0V, T_J=125^\circ\text{C}$			100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{DS}=0V, V_{GS}=30V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{DS}=0V, V_{GS}=-30V$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=27.5A$	--	56	69	$m\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0	--	5.0	V
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Trans conductance	$V_{DS}=15V, I_D=55A$		27	--	S
R_g	Gate resistance	$f=1.0\text{MHz}$		2.7		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{MHz}$	--	3350		pF
C_{oss}	Output Capacitance		--	463		
C_{rss}	Reverse Transfer Capacitance		--	33		

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=55A, V_{DD}=125V, R_G=10\Omega$	--	50		ns
t_r	Rise Time		--	179		
$t_{d(OFF)}$	Turn-Off Delay Time		--	83		
t_f	Fall Time		--	89		
Q_g	Total Gate Charge	$I_D=55A, V_{DD}=200V, V_{GS}=10V$	--	63.6		nC
Q_{gs}	Gate to Source Charge		--	21.5		
Q_{gd}	Gate to Drain ("Miller") Charge		--	25.8		

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	55	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	220	A
V_{SD}	Diode Forward Voltage	$I_S=55A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=55A, T_j = 25^\circ C$	--	242	--	ns
Q_{rr}	Reverse Recovery Charge	$dI_F/dt=100A/us, V_{GS}=0V$	--	2790	--	nC
I_{RRM}	Reverse Recovery Current		--	23.1	--	A
Pulse width $t_p \leq 300 \mu s, \delta \leq 2\%$						

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	2.5	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	62.5	$^\circ C/W$

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

^{a2}: $L=10.0mH, I_D=20.0A, \text{Start } T_j=25^\circ C$

^{a3}: $I_{SD}=55A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, \text{Start } T_j=25^\circ C$

Characteristics Curve:

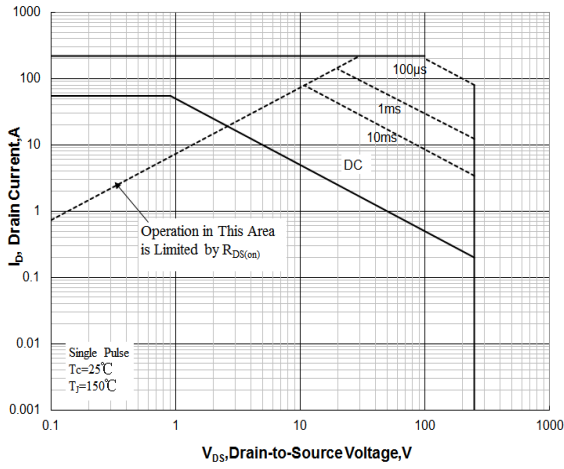


Figure 1 Maximum Forward Bias Safe Operating Area

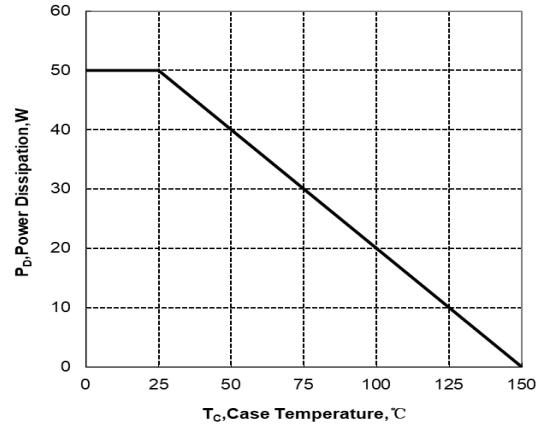


Figure 2 Maximum Power dissipation vs Case Temperature

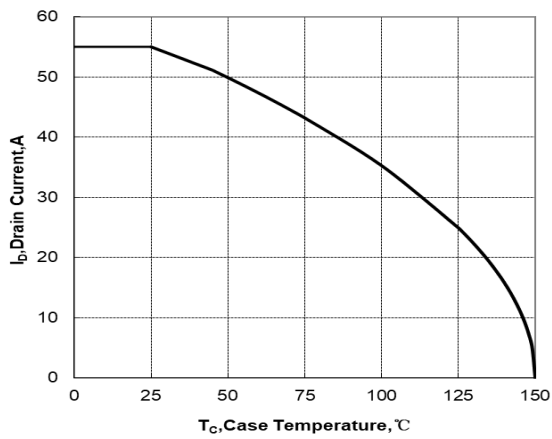


Figure 3 Maximum Continuous Drain Current vs Case Temperature

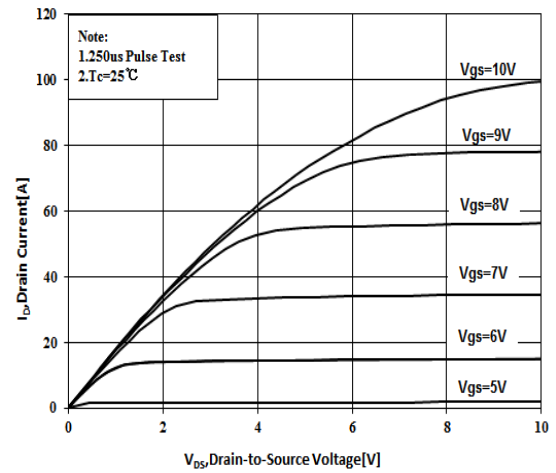


Figure 4 Typical Output Characteristics

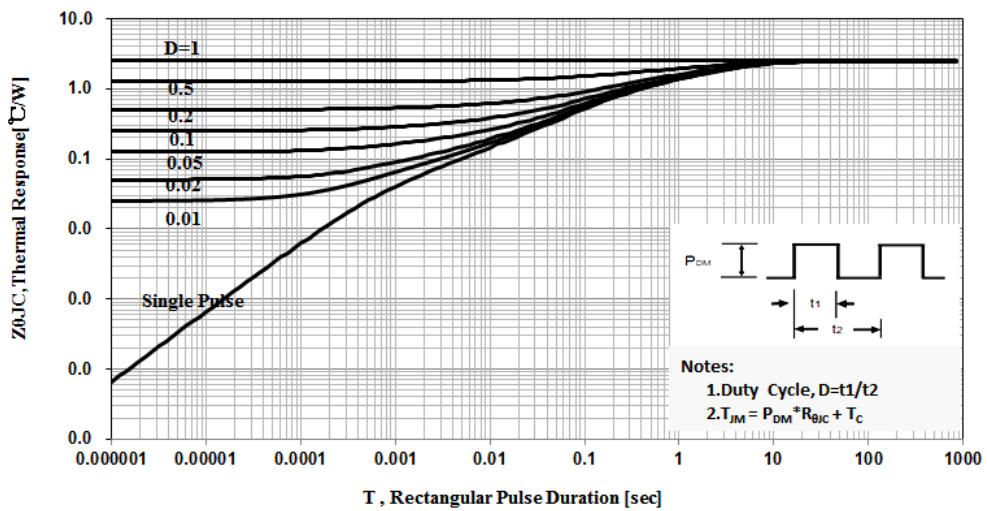


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

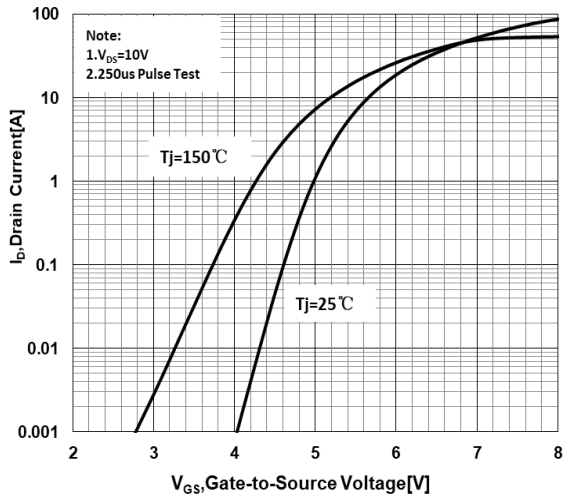


Figure 6 Typical Transfer Characteristics

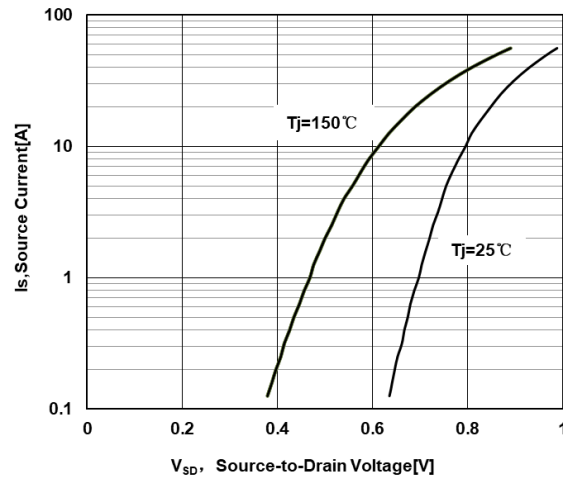


Figure 7 Typical Body Diode Transfer Characteristics

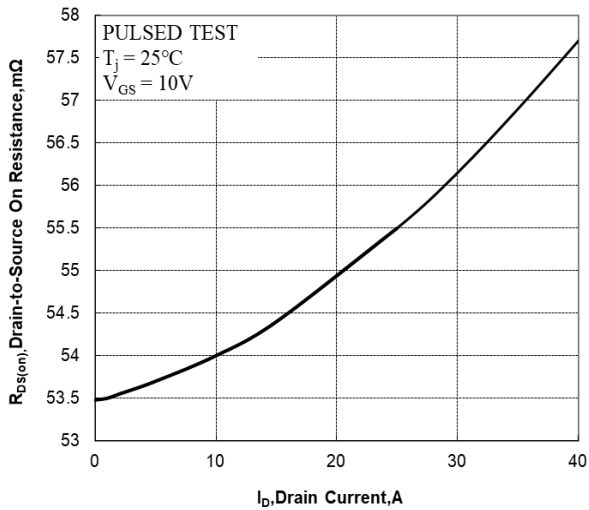


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

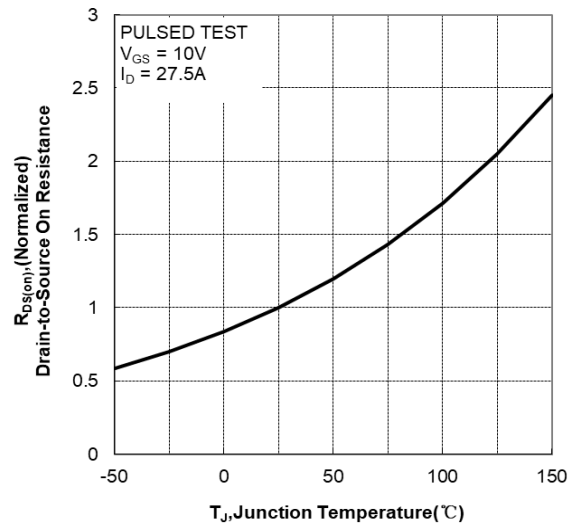


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

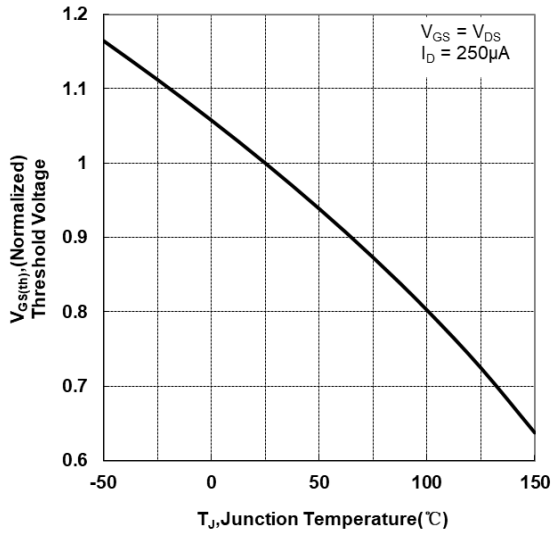


Figure 10 Typical Theshold Voltage vs Junction Temperature

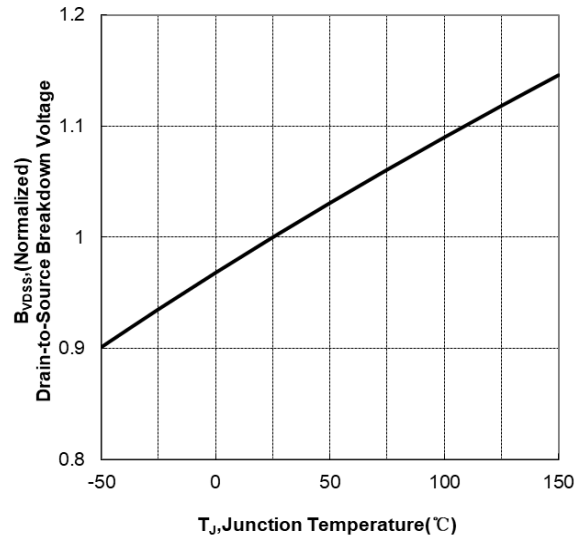


Figure 11 Typical Breakdown Voltage vs Junction Temperature

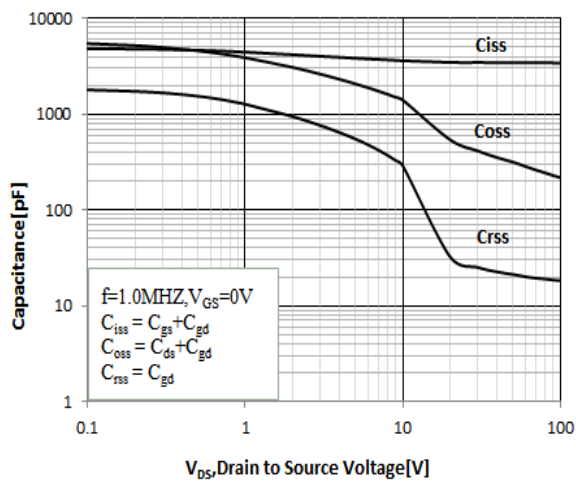


Figure 12 Typical Capacitance vs Drain to Source Voltage

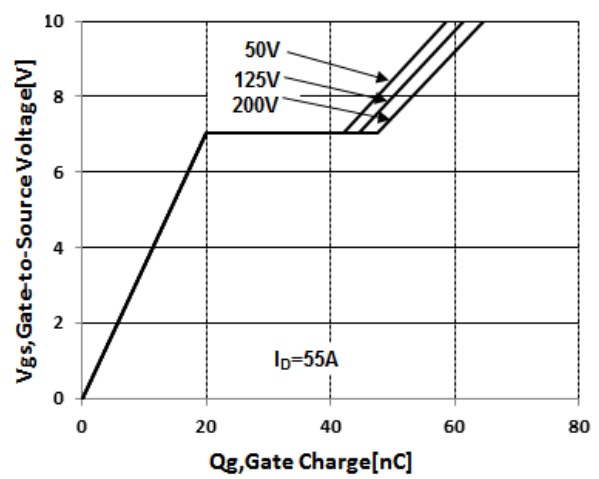


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform

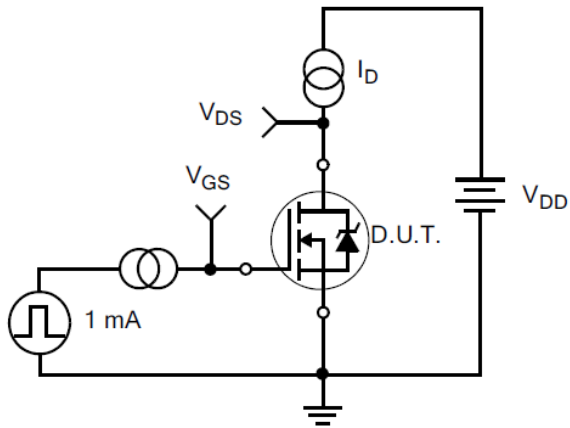


Figure 14. Gate Charge Test Circuit

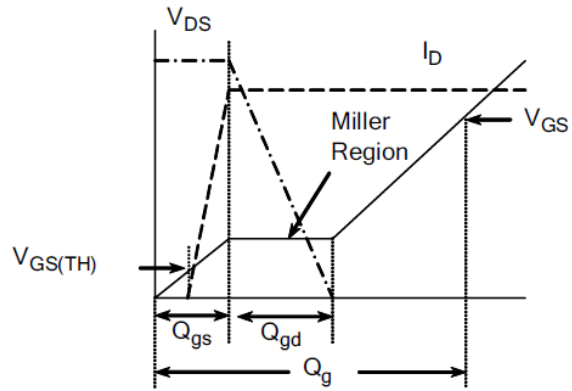


Figure 15. Gate Charge Waveforms

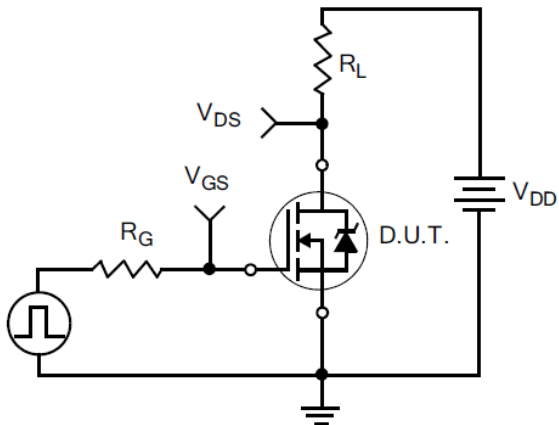


Figure 16. Resistive Switching Test Circuit

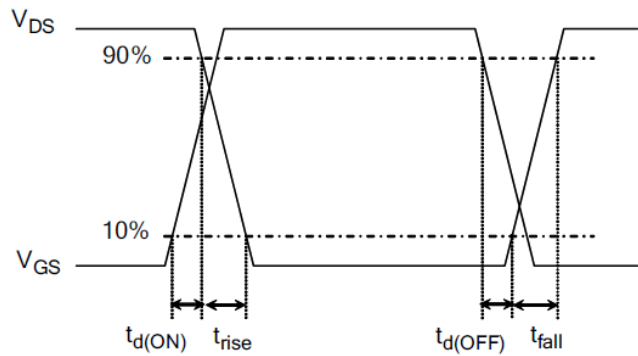


Figure 17. Resistive Switching Waveforms

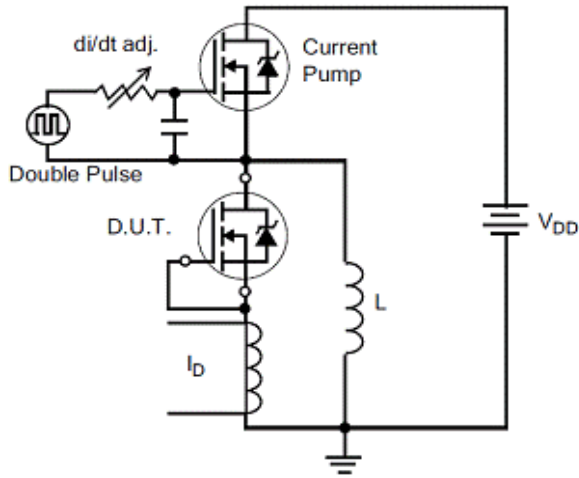


Figure 18. Diode Reverse Recovery Test Circuit

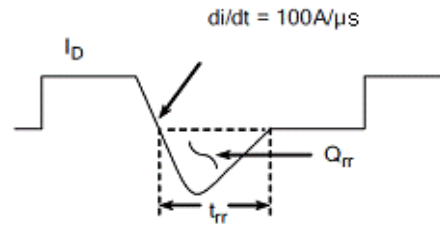


Figure 19. Diode Reverse Recovery Waveform

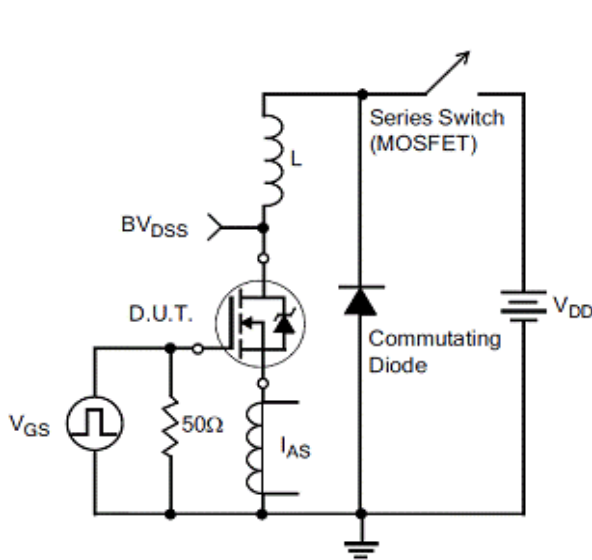


Figure20.Unclamped Inductive Switching Test Circuit

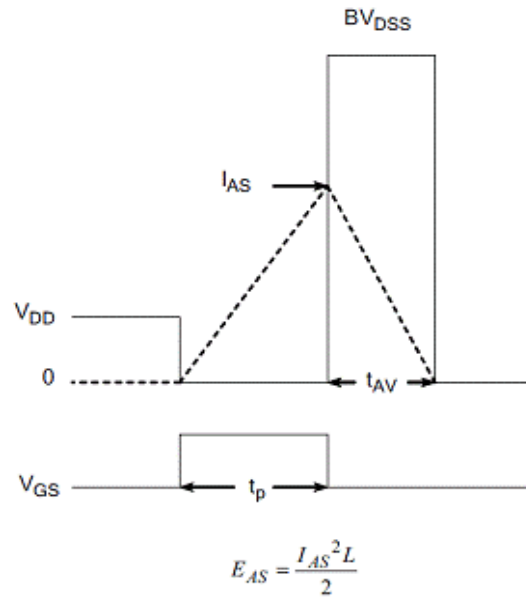
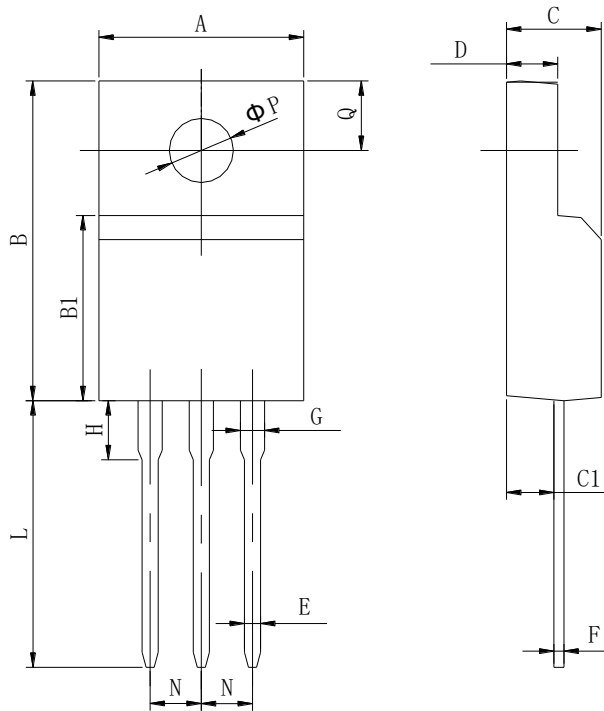


Figure21.Unclamped Inductive Switching Waveform

Package Information


Items	Values(mm)	
	MIN	MAX
A	9.60	10.4
B	15.4	16.2
B1	8.90	9.50
C	4.30	4.90
C1	2.10	3.00
D	2.40	3.00
E	0.60	1.00
F	0.30	0.60
G	1.12	1.42
H	3.40	3.80
L	12.0	14.0
N	2.34	2.74
Q	3.15	3.55
ϕP	2.90	3.30

TO-220F Package