

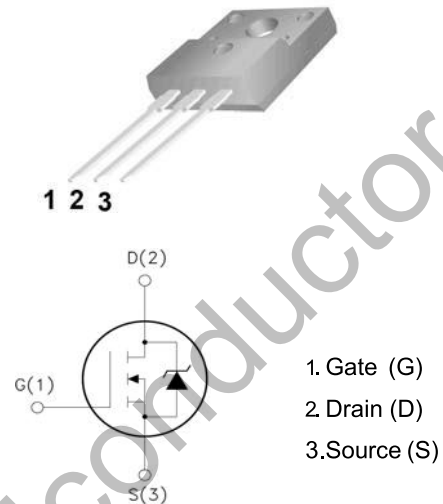


WGF12N80S

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Q_G=51 nC (Typ.).
- B_VD_{SS}=800V, I_D=12 A
- R_{DS(on)} : 0.68 Ω (Typ) @V_G=10V
- 100% Avalanche Tested

TO-220F



Absolute (T_J= 25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
V _{DSS}	Drain-to-Source Voltage	800	V
I _D	Continuous Drain Current T _C = 25 °C	12	A
	Continuous Drain Current T _C = 100 °C	7.5	A
I _{DM} ^{a1}	Pulsed Drain Current T _C = 25 °C	48	A
V _{GS}	Gate-to-Source Voltage	± 30	V
E _{AS} ^{a2}	Single Pulse Avalanche Energy	1444	mJ
dv/dt ^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P _D	Power Dissipation T _C = 25 °C	41	W
	Derating Factor above 25 °C	0.328	W/°C
V _{ESD(G-S)}	Gate source ESD (HBM-C= 100pF, R=1.5kΩ)	3000	V
T _J , T _{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T _L	Maximum Temperature for Soldering	300	°C

Symbol	Parameter	Max.	Units
R _{θJC}	Junction-to-Case	3.02	°C/W
R _{θJA}	Junction-to-Ambient	62.5	°C/W

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	$V_{GS}=0V, I_D=250\mu A$	800	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A, \text{Reference } 25^\circ\text{C}$	--	0.9	--	V/ $^\circ\text{C}$
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=800V, V_{GS}=0V, T_J=25^\circ\text{C}$	--	--	25	μA
		$V_{DS}=640V, V_{GS}=0V, T_J=125^\circ\text{C}$			250	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{DS}=0V, V_{GS}=20V$	--	--	10	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{DS}=0V, V_{GS}=-20V$	--	--	-10	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=5A$	--	0.68	0.75	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	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	$V_{DS}=15V, I_D=5A$		15	--	S
R_g	Gate resistance	$f=1.0\text{MHz}$		3.1		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{MHz}$	--	2764		pF
C_{oss}	Output Capacitance		--	224		
C_{rss}	Reverse Transfer Capacitance		--	11.4		

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=12A, V_{DD}=400V, R_G=10\Omega$	--	29.4		ns
t_r	Rise Time		--	39.6		
$t_{d(OFF)}$	Turn-Off Delay Time		--	29		
t_f	Fall Time		--	40		
Q_g	Total Gate Charge	$I_D=12A, V_{DD}=640V, V_{GS}=10V$	--	51		nC
Q_{gs}	Gate to Source Charge		--	12.4		
Q_{gd}	Gate to Drain ("Miller") Charge		--	16.4		

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	12	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	48	A
V_{SD}	Diode Forward Voltage	$I_S=12A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=12A, T_j = 25^\circ C$	--	721	--	ns
Q_{rr}	Reverse Recovery Charge	$dI_F/dt=100A/us, V_{GS}=0V$	--	8650	--	nC
I_{RRM}	Reverse Recovery Current		--	23.9	--	A
Pulse width $t_p \leq 300 \mu s, \delta \leq 2\%$						

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

^{a2}: $L=10.0mH, I_D=17.0A, Start T_j=25^\circ C$

^{a3}: $I_{SD}=12A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_j=25^\circ C$

Typical Characteristics

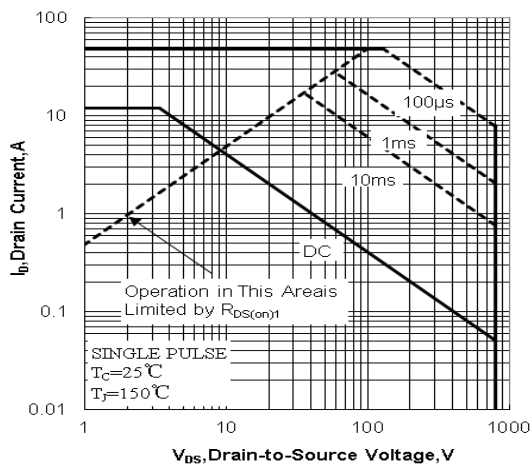


Figure 1 Maximum Forward Bias Safe Operating Area

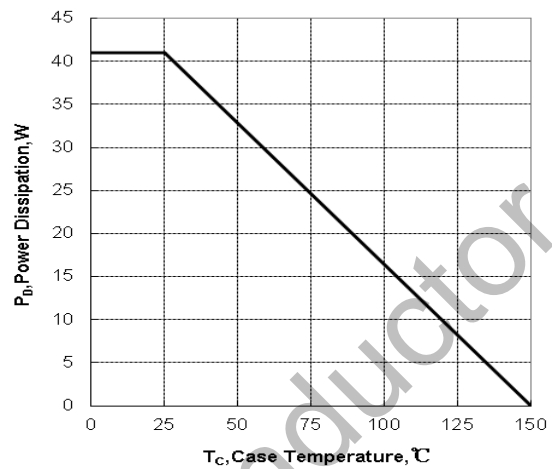


Figure 2 Maximum Power dissipation vs Case Temperature

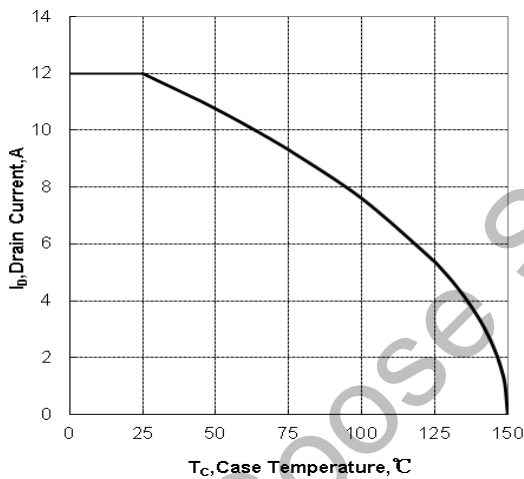


Figure 3 Maximum Continuous Drain Current vs Case Temperature

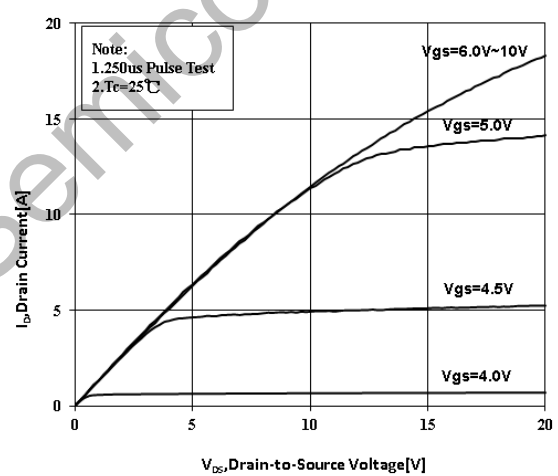


Figure 4 Typical Output Characteristics

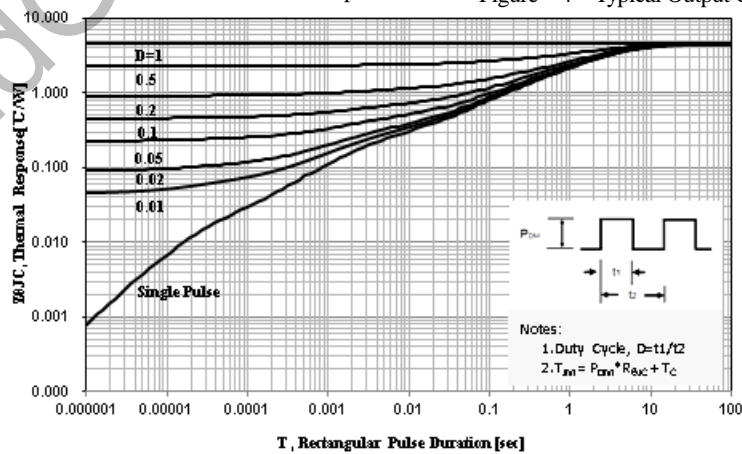


Figure 5 Maximum Effective Thermal Impedance, Junction to Case

Typical Characteristics (Continued)

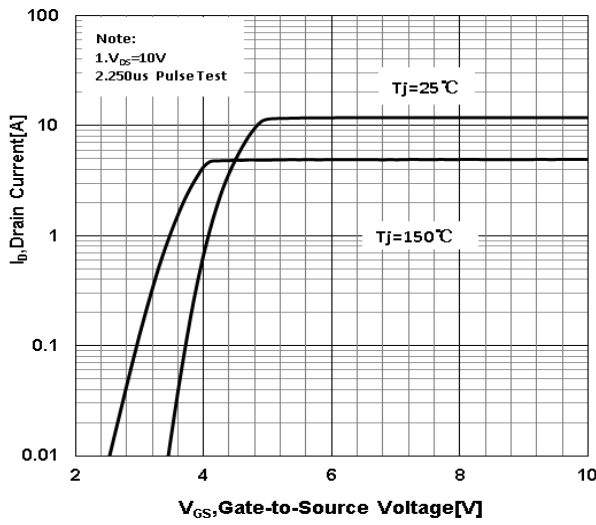


Figure 6 Typical Transfer Characteristics

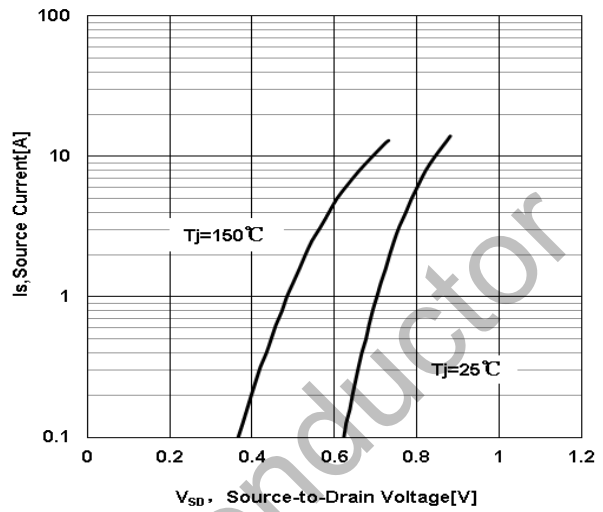


Figure 7 Typical Body Diode Transfer Characteristics

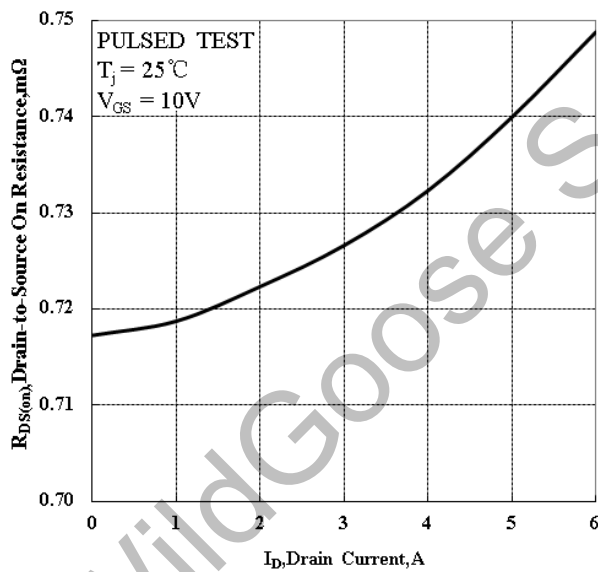


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

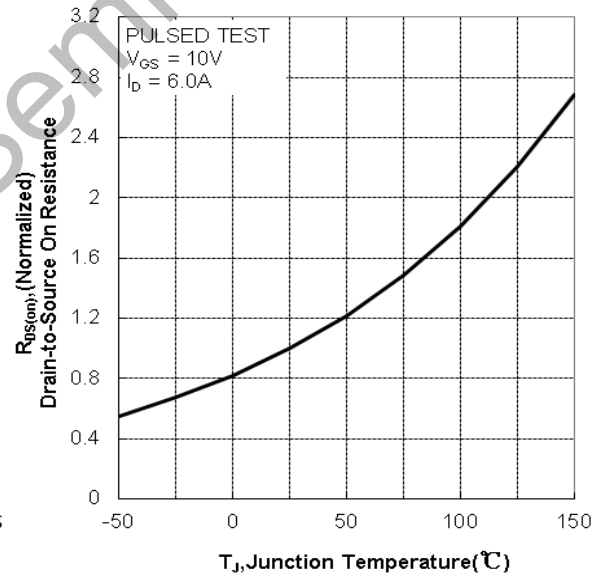


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

Typical Characteristics (Continued)

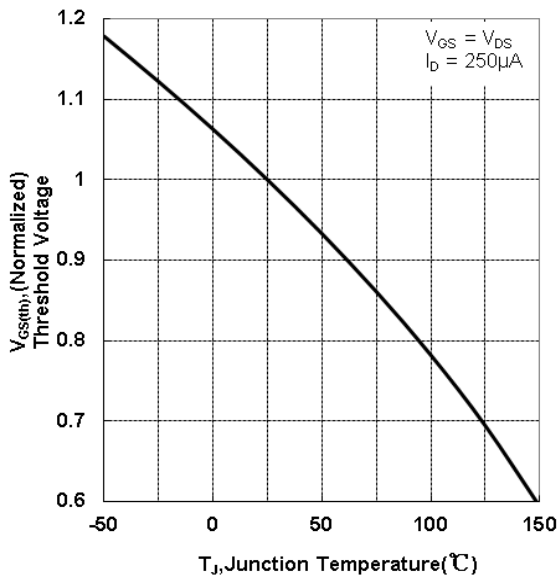


Figure 10 Typical Theshold Voltage vs Junction Temperature

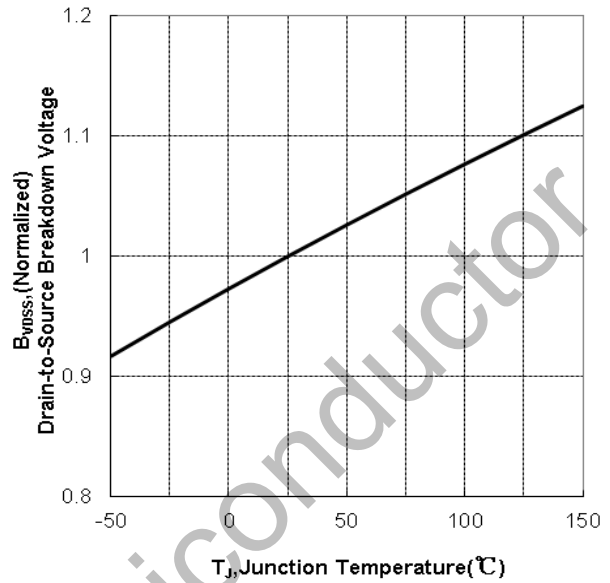


Figure 11 Typical Breakdown Voltage vs Junction Temperature

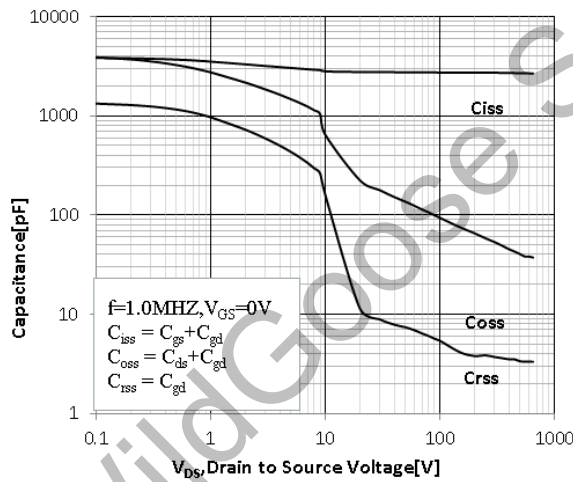


Figure 12 Typical Capacitance vs Drain to Source Voltage

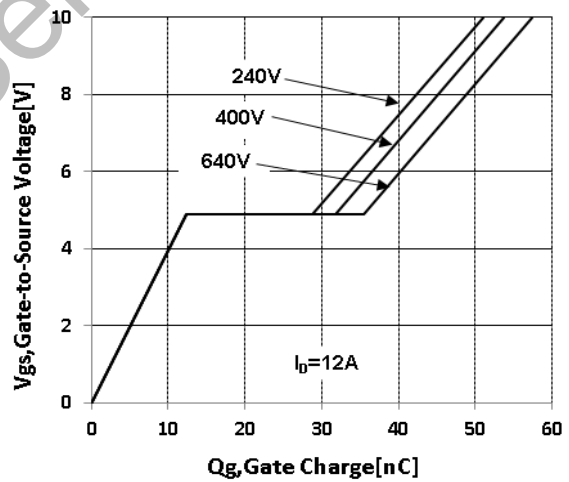


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform :

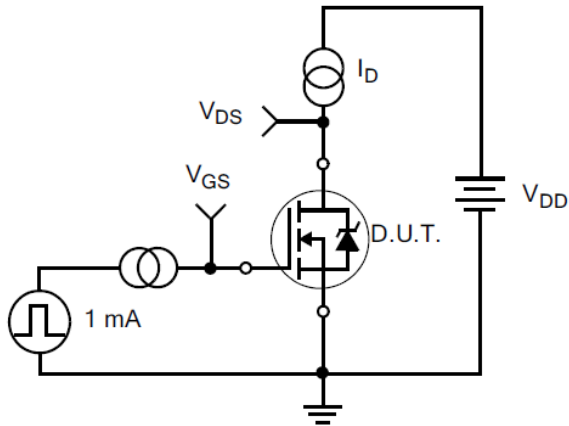


Figure 14. Gate Charge Test Circuit

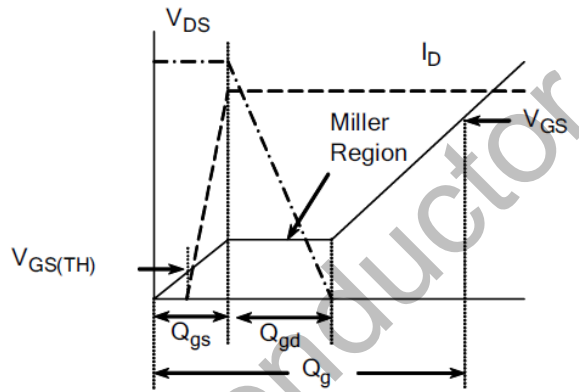


Figure 15. Gate Charge Waveforms

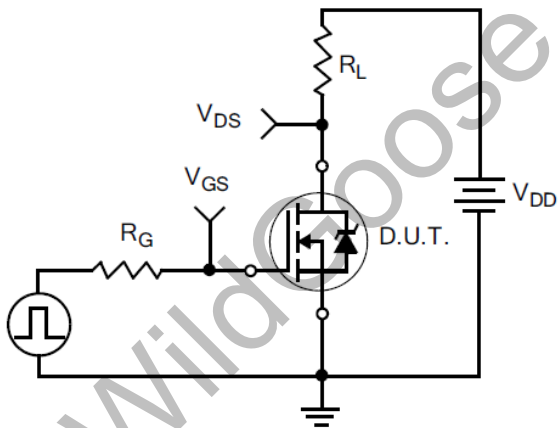


Figure 16. Resistive Switching Test Circuit

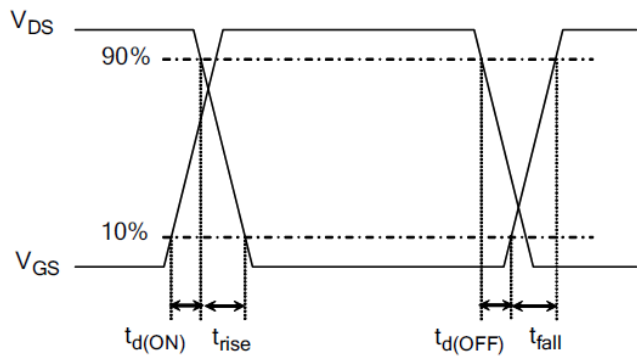


Figure 17. Resistive Switching Waveforms

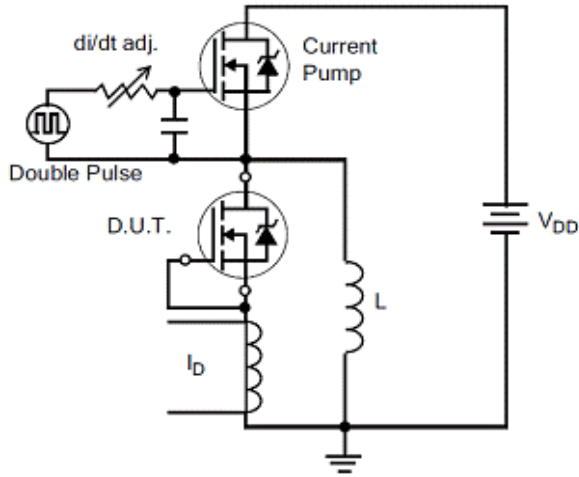


Figure 18. Diode Reverse Recovery Test Circuit

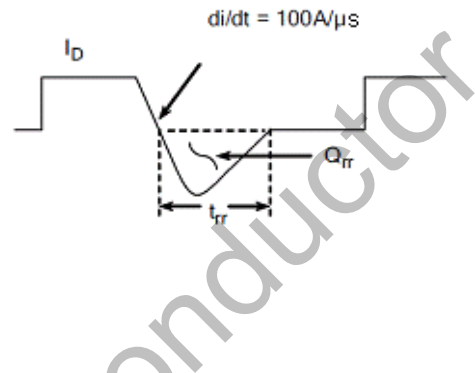


Figure 19. Diode Reverse Recovery Waveform

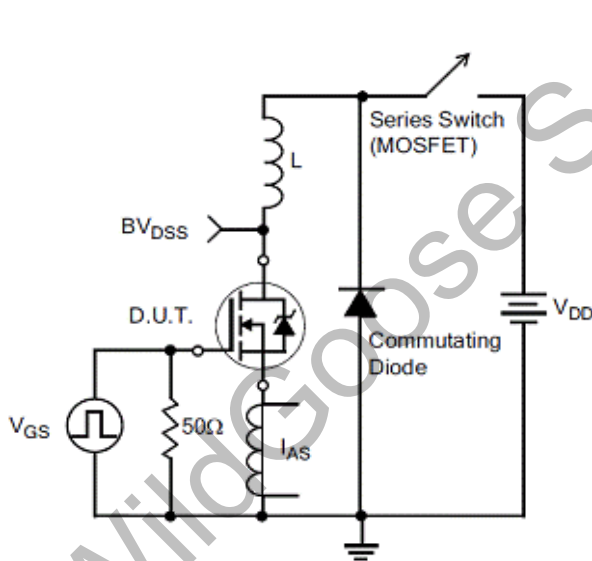


Figure20.Unclamped Inductive Switching Test Circuit

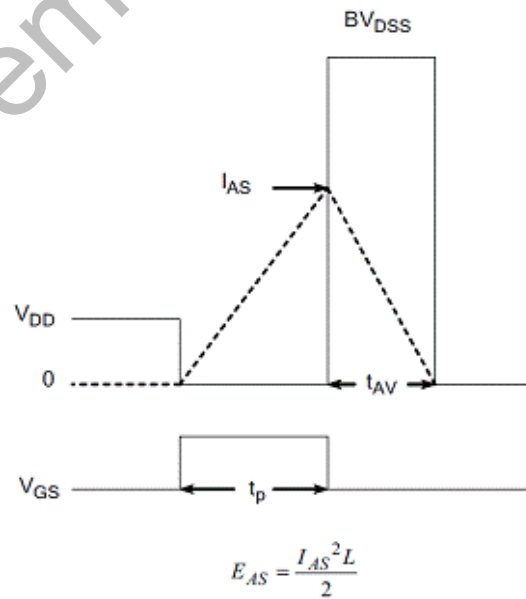
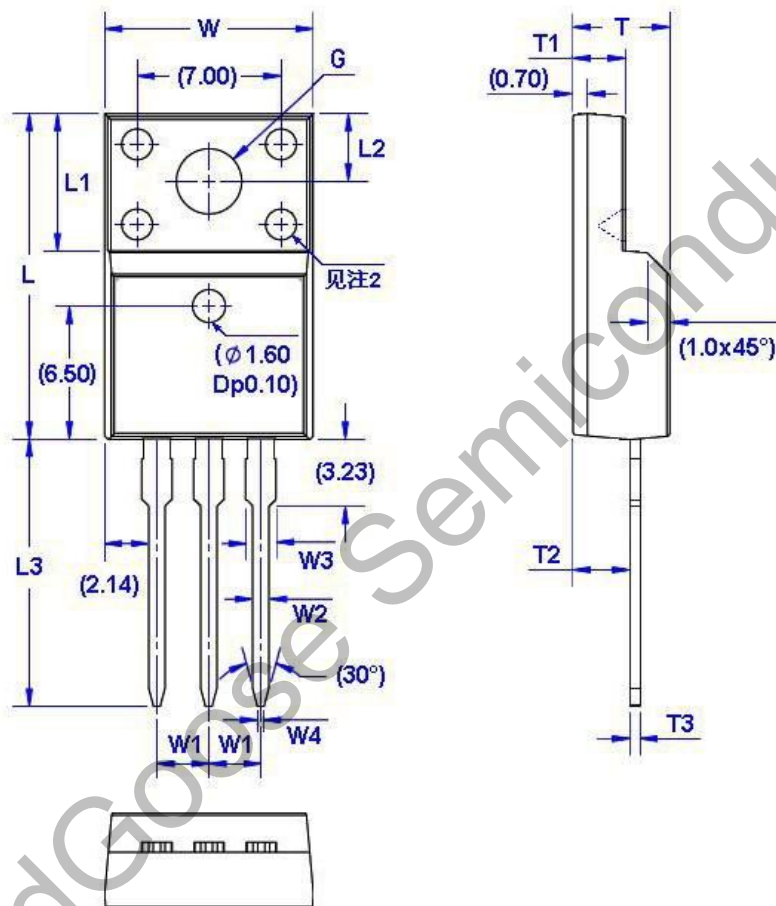


Figure21.Unclamped Inductive Switching Waveform

Package Dimension

TO-220F

Unit: mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.96	10.36	W4	0.25	0.45	L3	12.78	13.18	T3	0.45	0.60
W1	2.54 (TYP)		L	15.67	16.07	T	4.50	4.90	G(Φ)	3.08	3.28
W2	0.70	0.90	L1	6.48	6.88	T1	2.34	2.74			
W3	1.24	1.47	L2	3.20	3.40	T2	2.56	2.96			