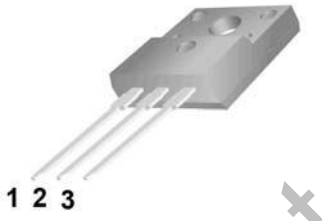
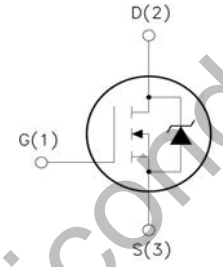
WGF12N80S

TO-220F





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

Features:

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

Absolute（T_J= 25℃ unless otherwise specified）:

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	800	V
I_D	Continuous Drain Current T_C = 25 ℃	12	A
	Continuous Drain Current T_C = 100 ℃	7.5	A
I_{DM} [a1]	Pulsed Drain Current T_C = 25 ℃	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 ℃	41	W
	Derating Factor above 25 ℃	0.328	W/℃
$V_{ESD(G-S)}$	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	℃
T_L	Maximum Temperature for Soldering	300	℃

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	3.02	℃/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	℃/W

Electrical Characteristics（T_J= 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=250μA	800	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	ID=250uA,Reference25℃	--	0.9	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS} =800V, V_{GS}= 0V, T_J = 25℃	--	--	25	μA
		V_{DS} =640V, V_{GS}= 0V, T_J = 125℃			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 = 250μA	2.0	--	4.0	V
Pulse width tp≤300μs, δ ≤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 = 1.0MHz		3.1		Ω
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1.0MHz	--	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 =10Ω	--	29.4		ns
tr	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 VDD =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
trr	Reverse Recovery Time	I_S=12A,T_j = 25° C	--	721	--	ns
Qrr	Reverse Recovery Charge	dI_F/dt=100A/us, V_{GS}=0V	--	8650	--	nC
I_{RRM}	Reverse Recovery Current		--	23.9	--	A
Pulse width tp≤300μs, δ ≤2%						

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

[a2]: L=10.0mH, I_D=17.0A, Start T_J=25℃

[a3]: I_{SD} =12A,di/dt ≤100A/us,V_{DD}≤$BV_{DS,}$ Start T_J=25℃

Typical Characteristics

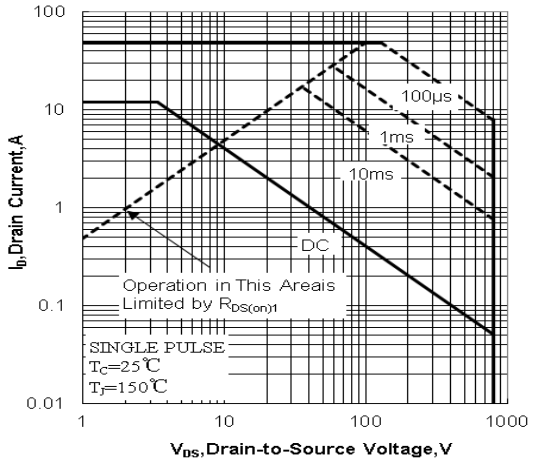


Figure 1 Maximum Forward Bias Safe Operating Area

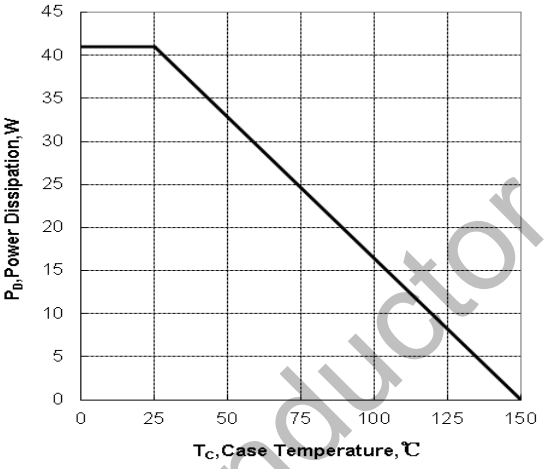


Figure 2 Maximum Power dissipation vs Case Temperature

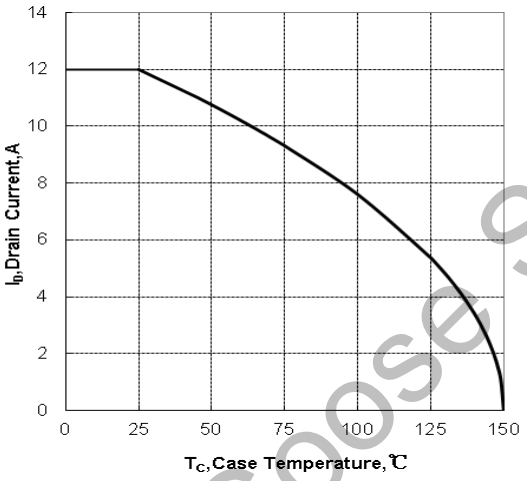


Figure 3 Maximum Continuous Drain Current vs Case Temperature

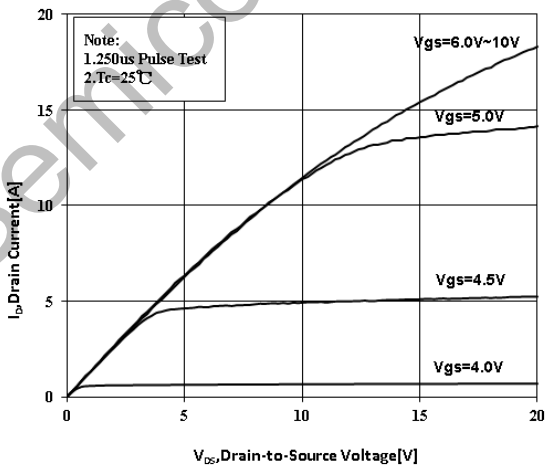


Figure 4 Typical Output Characteristics

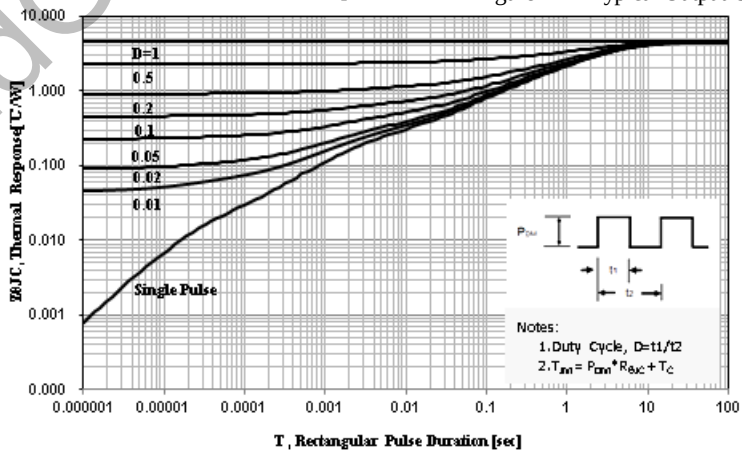


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

Typical Characteristics (Continued)

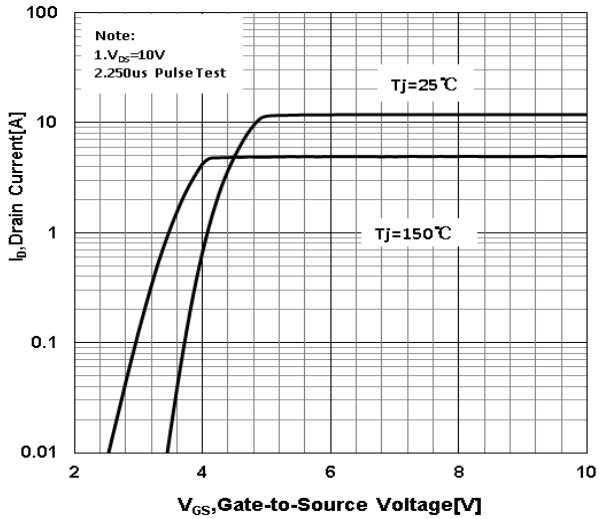


Figure 6 Typical Transfer Characteristics

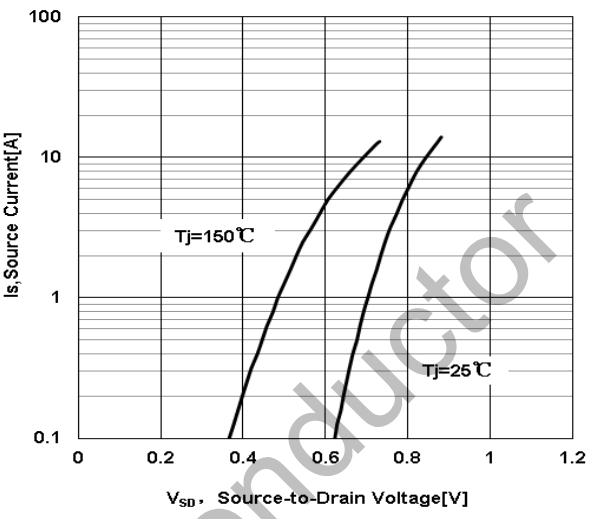


Figure 7 Typical Body Diode Transfer Characteristics

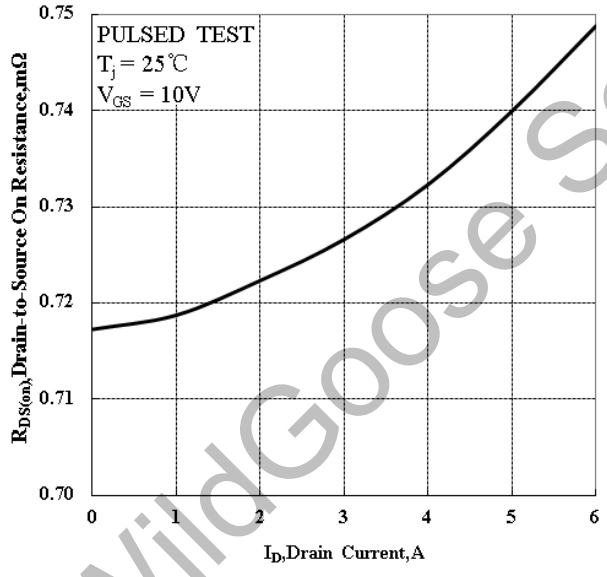


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

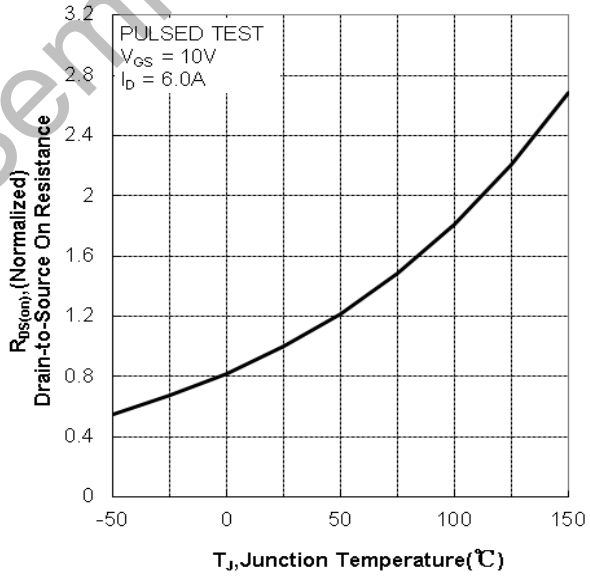


Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

p

Typical Characteristics (Continued)

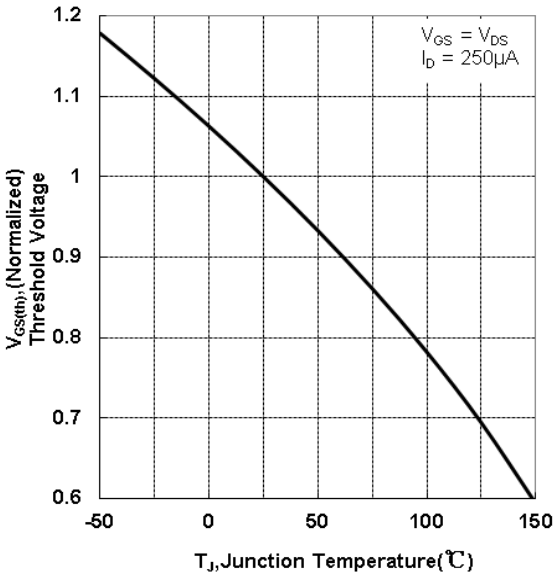


Figure 10 Typical Theshold Voltage vs Junction Temperature

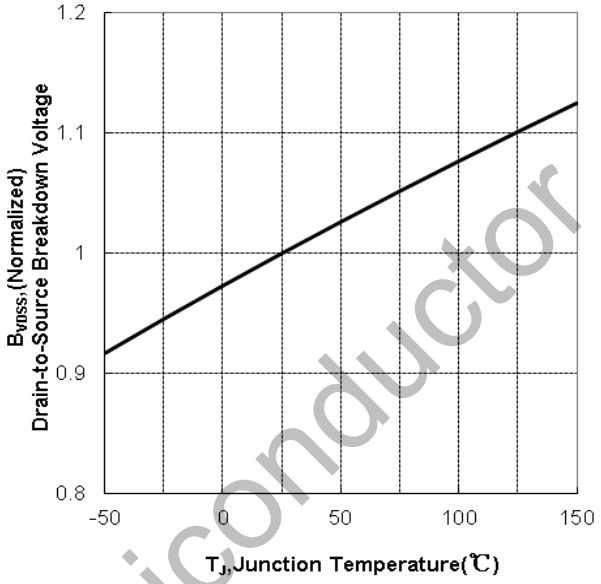


Figure 11 Typical Breakdown Voltage vs Junction Temperature

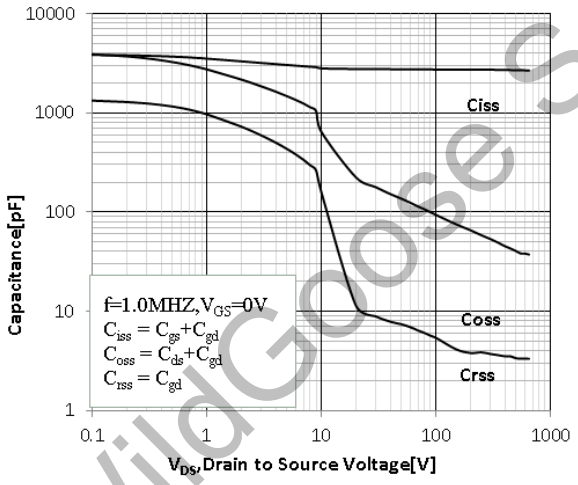


Figure 12 Typical Capacitance vs Drain to Source Voltage

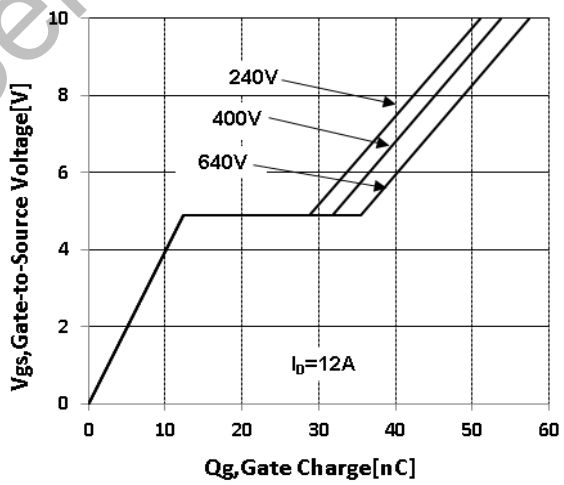


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform :

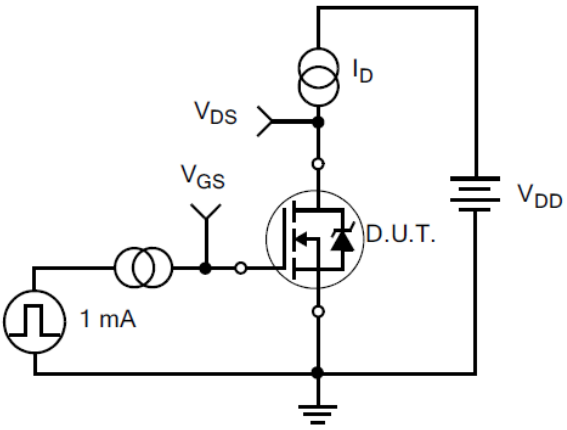


Figure 14. Gate Charge Test Circuit

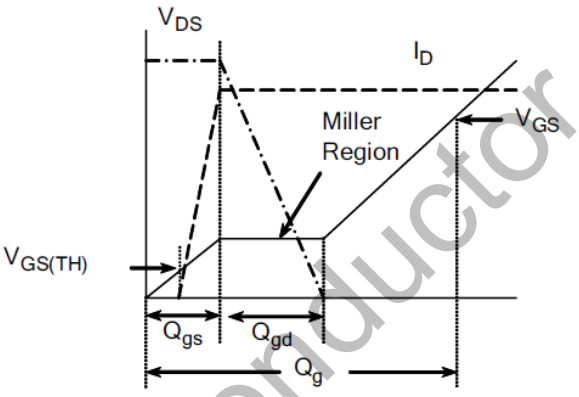


Figure 15. Gate Charge Waveforms

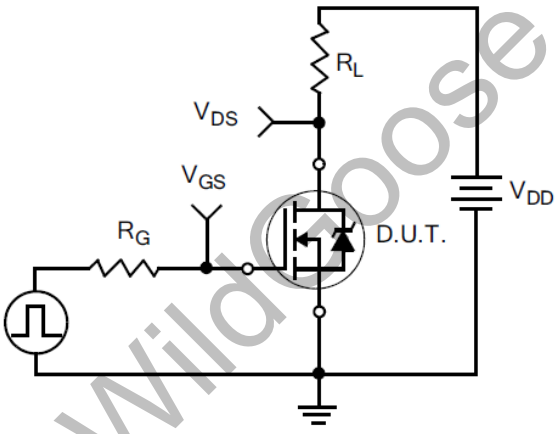


Figure 16. Resistive Switching Test Circuit

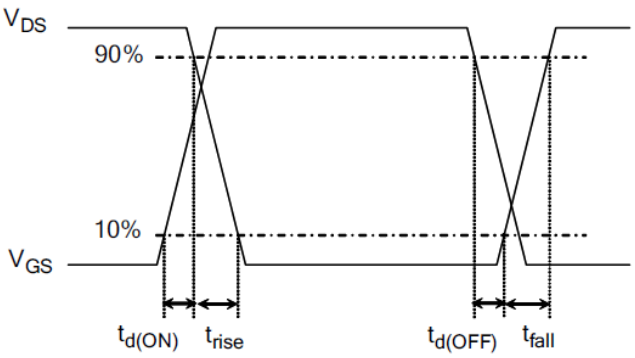


Figure 17. Resistive Switching Waveforms

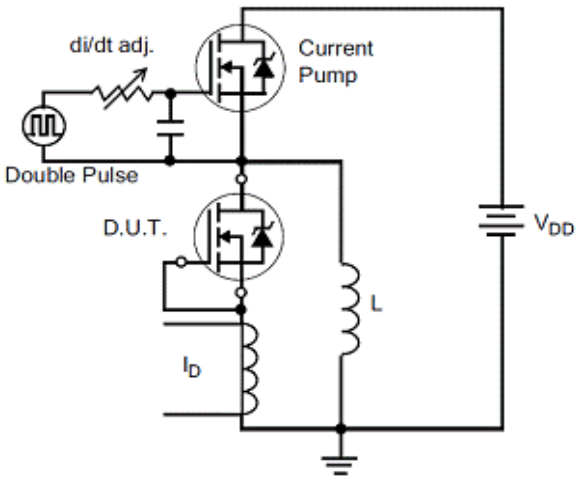


Figure 18. Diode Reverse Recovery Test Circuit

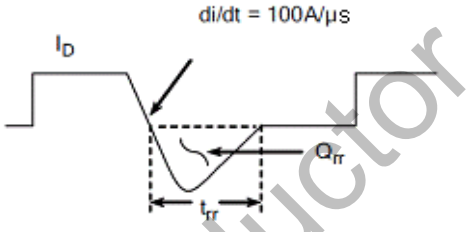


Figure 19. Diode Reverse Recovery Waveform

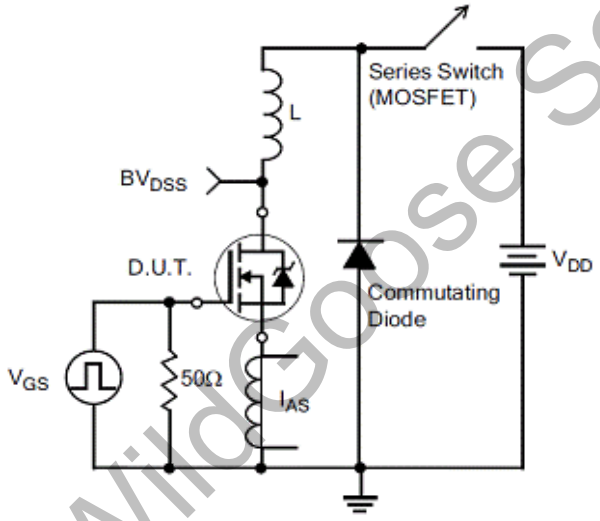


Figure20.Unclamped Inductive Switching Test Circuit

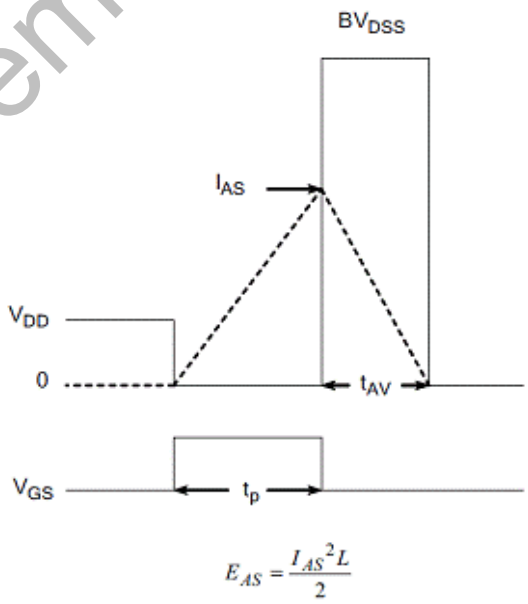
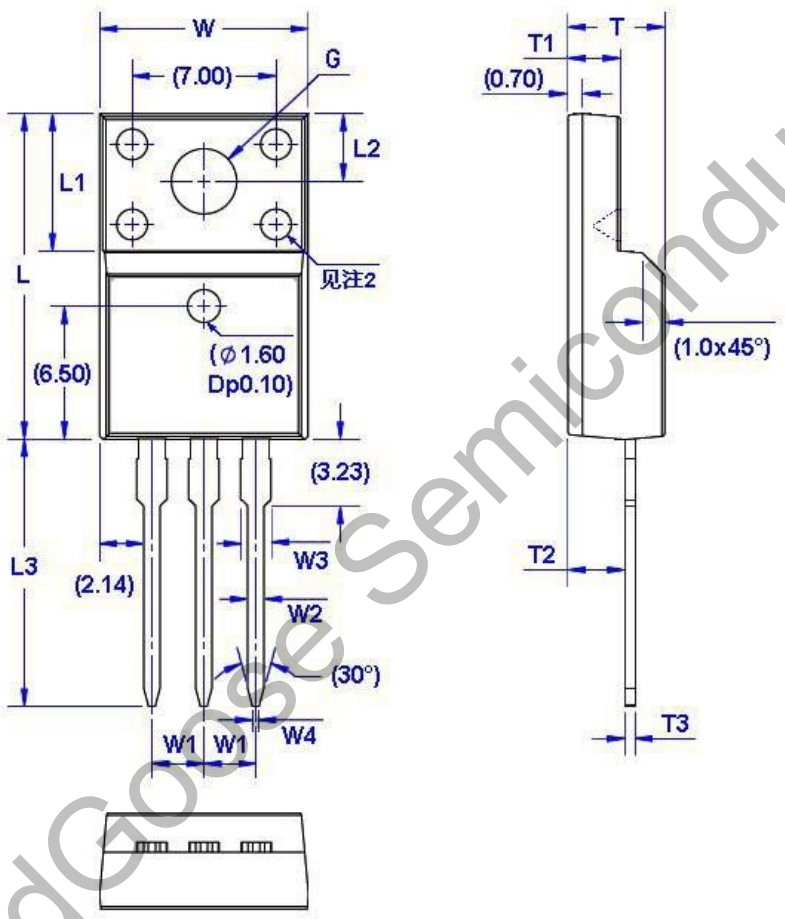


Figure21.Unclamped Inductive Switching Waveform

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			

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