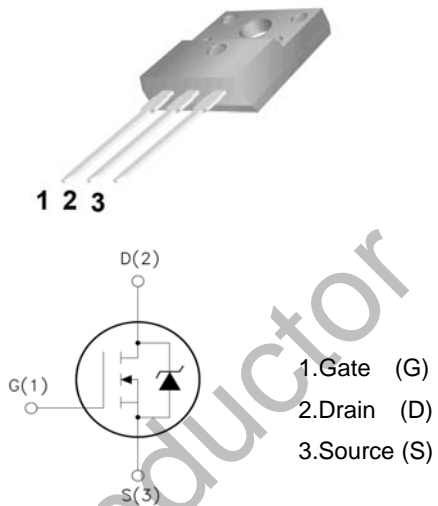


## WGF6N90S

**Features:**

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Qg=31.1nC(Typ.).
- BV<sub>DSS</sub>=900V, I<sub>D</sub>=6A
- R<sub>DS(on)</sub> : 2Ω (Typ.) @V<sub>G</sub>=10V
- 100% Avalanche Tested

TO-220F



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

**Absolute Maximum Ratings** (Ta=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain-Source Voltage	900	V
I <sub>D</sub>	Drain Current	T <sub>j</sub> =25°C	6.0
		T <sub>j</sub> =100°C	3.7
V <sub>GS(TH)</sub>	Gate Threshold Voltage	±30	V
E <sub>AS</sub>	Single Pulse Avalanche Energy	466	mJ
I <sub>DM</sub>	Pulsed Drain Current (Tc= 25°C)	24	A
P <sub>D</sub>	Power Dissipation (Tc= 25°C)	33	W
T <sub>j</sub>	Junction Temperature(Max)	150	°C
T <sub>stg</sub>	Storage Temperature	-55~+150	°C
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	°C

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	-	3.8	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	-	62.5	°C/W

**Electrical Characteristics** (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0	900	-	-	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> =250μA, Reference to 25°C	-	0.96	-	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =900V, V <sub>GS</sub> =0V	-	-	10	μA
		V <sub>DS</sub> =720V, T <sub>J</sub> =125°C	-	-	100	
I <sub>GSSF</sub>	Gate-body leakage Current, Forward	V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V	-	-	100	nA
I <sub>GSSR</sub>	Gate-body leakage Current, Reverse	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	-	-	-100	
<b>On Characteristics</b>						
V <sub>GS(TH)</sub>	Gate Threshold Voltage	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	2	-	4	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	I <sub>D</sub> =3A, V <sub>GS</sub> =10V	-	2.0	2.3	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0, f=1.0MHz	-	1435	-	pF
C <sub>oss</sub>	Output Capacitance		-	100	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	5.2	-	
<b>Switching Characteristics</b>						
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =450V, I <sub>D</sub> =6A R <sub>G</sub> =10Ω	-	17.6	-	nS
T <sub>r</sub>	Turn-On Rise Time		-	17.2	-	
T <sub>d(off)</sub>	Turn-Off Delay Time		-	43.6	-	
T <sub>f</sub>	Turn-Off Rise Time		-	20.2	-	
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =630V, V <sub>GS</sub> =10V, I <sub>D</sub> =6A	-	31.1	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	13.6	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	6.3	-	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Max. Diode Forward Current	T <sub>C</sub> = 25°C	-	-	6	A
I <sub>SM</sub>	Max. Pulsed Forward Current	T <sub>C</sub> = 25°C	-	-	24	
V <sub>SD</sub>	Diode Forward Voltage	I <sub>D</sub> =3A	-	-	1.5	V
T <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =6A, V <sub>GS</sub> =0V diF/dt=100A/μs	-	727	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge	(Note3)	-	5.3	-	μC

Notes : 1, L=10mH, I<sub>AS</sub>=9.7A, Starting T<sub>J</sub>=25°C

2, Repetitive Rating : Pulse width limited by maximum junction temperature

3, Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%

Typical Characteristics

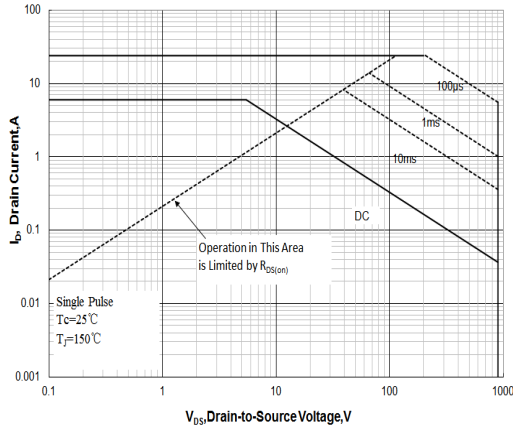


Figure 1 Maximum Forward Bias Safe Operating Area

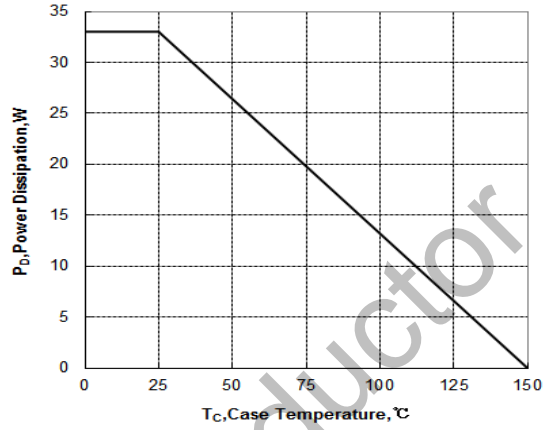


Figure 2 Maximum Power dissipation vs Case Temperature

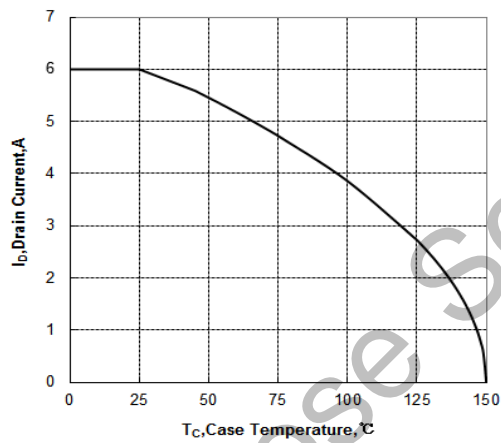


Figure 3 Maximum Continuous Drain Current vs Case Temperature

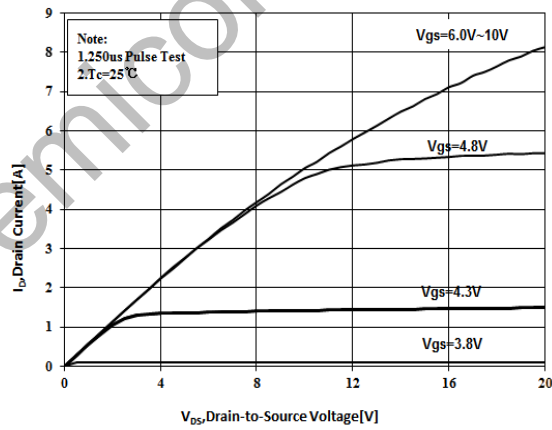


Figure 4 Typical Output Characteristics

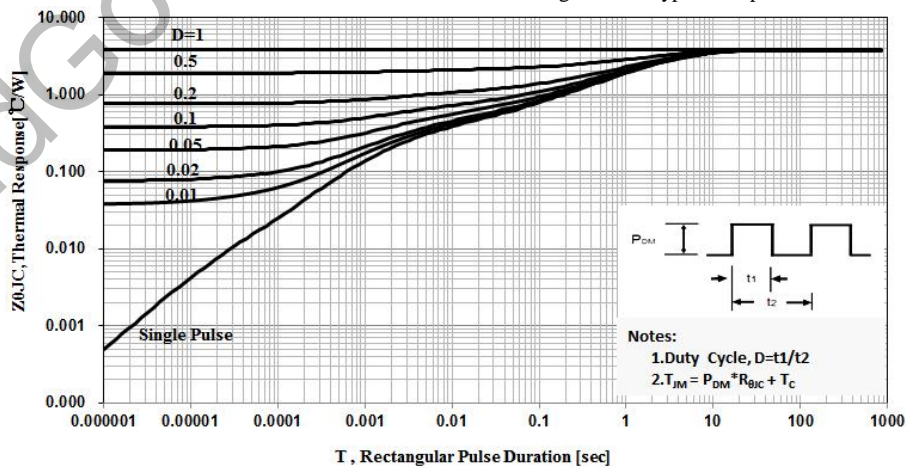


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

Typical Characteristics (Continued)

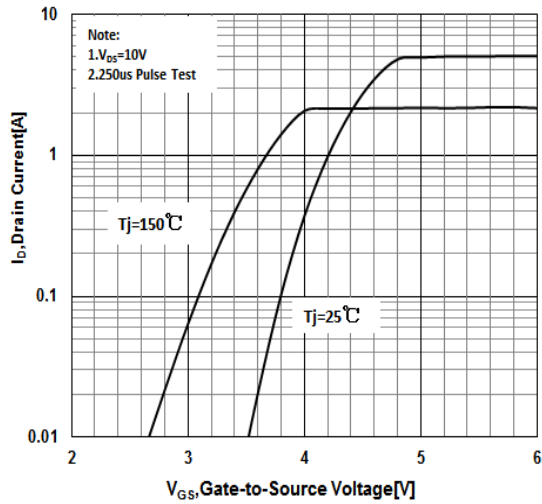


Figure 6 Typical Transfer Characteristics

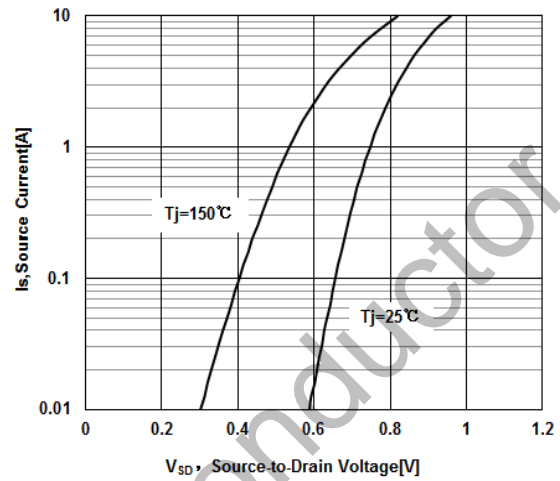


Figure 7 Typical Body Diode Transfer Characteristics

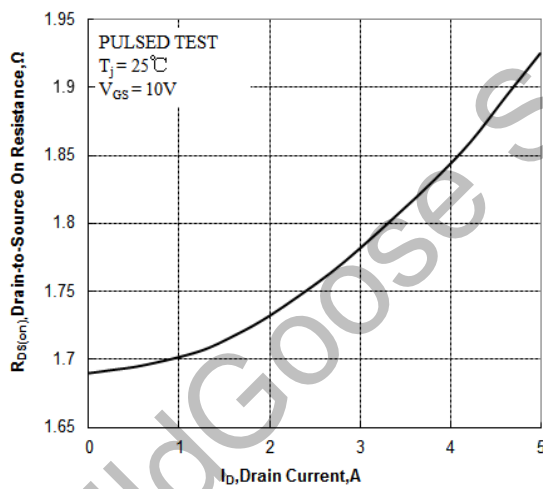


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

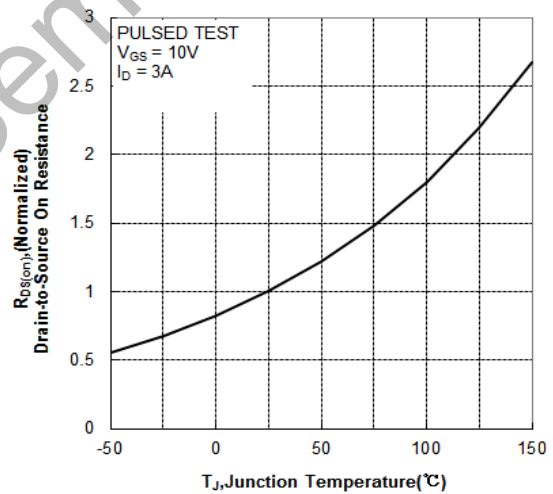


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

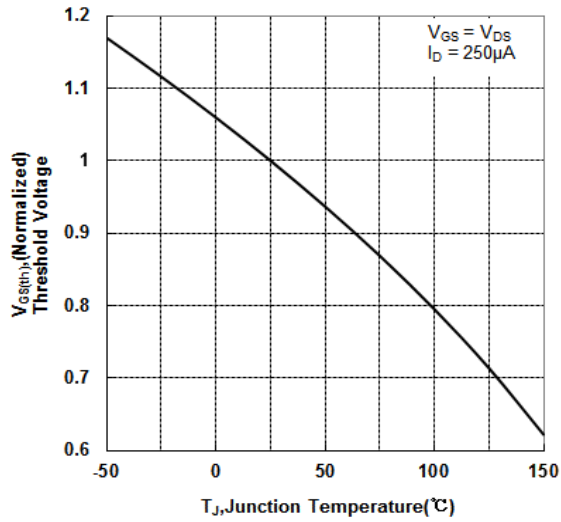


Figure 10 Typical Theshold Voltage vs Junction Temperature

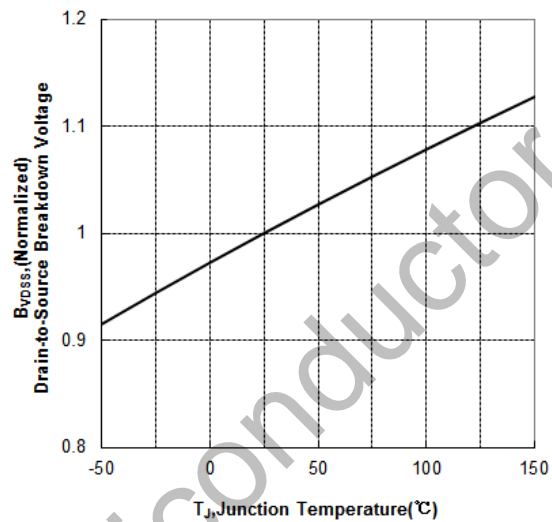


Figure 11 Typical Breakdown Voltage vs Junction Temperature

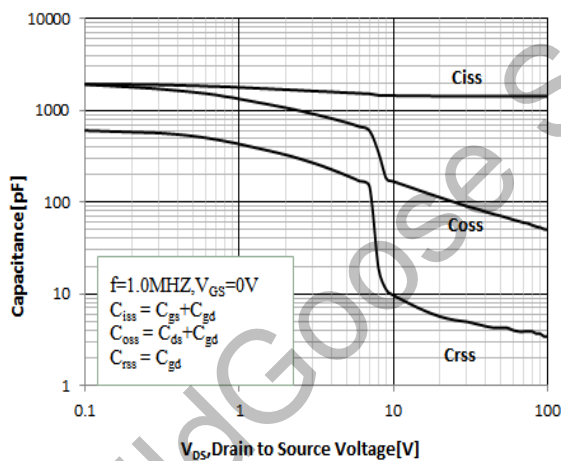


Figure 12 Typical Capacitance vs Drain to Source Voltage

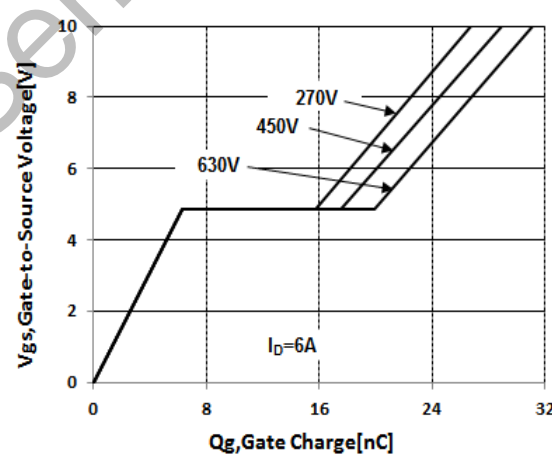


Figure 13 Typical Gate Charge vs Gate to Source Voltage

**Test Circuit and Waveform**

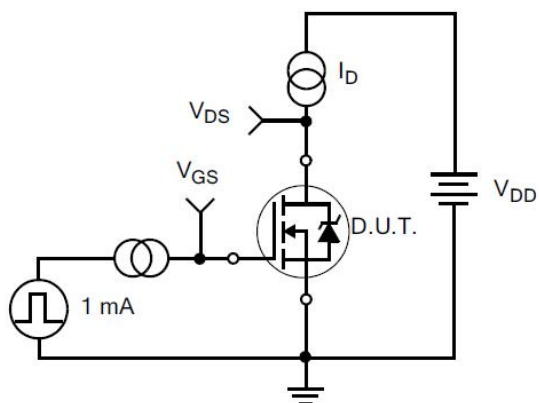


Figure 14. Gate Charge Test Circuit

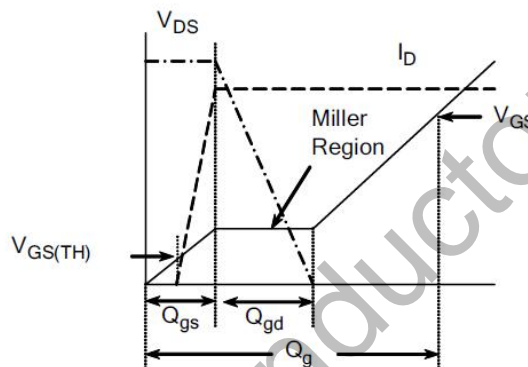


Figure 15. Gate Charge Waveforms

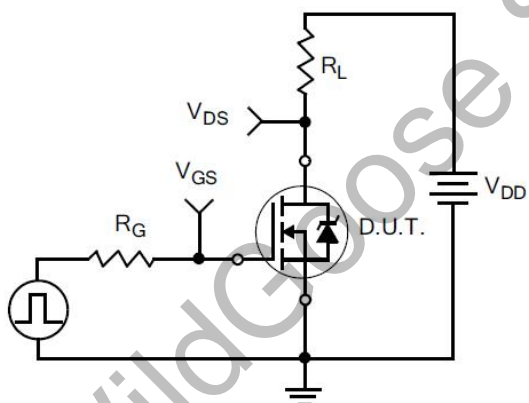


Figure 16. Resistive Switching Test Circuit

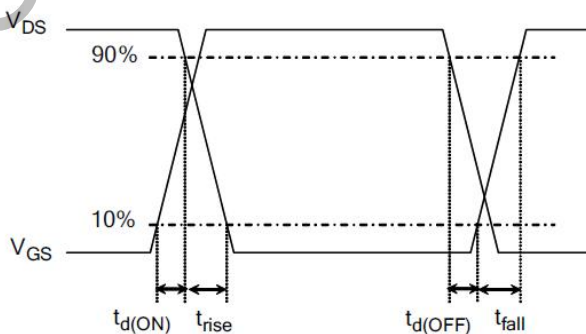


Figure 17. Resistive Switching Waveforms

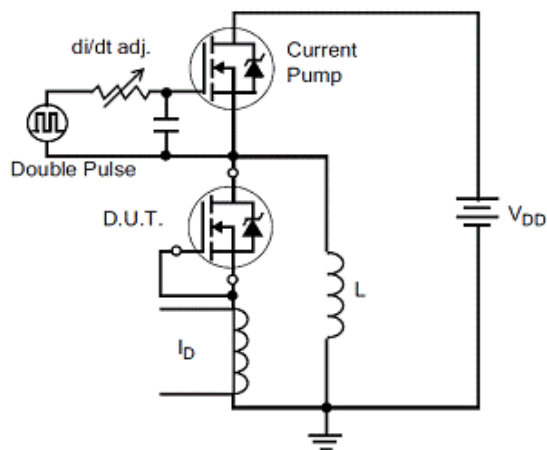


Figure 18. Diode Reverse Recovery Test Circuit

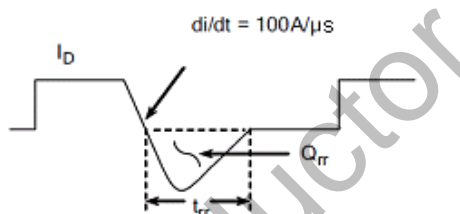


Figure 19. Diode Reverse Recovery Waveform

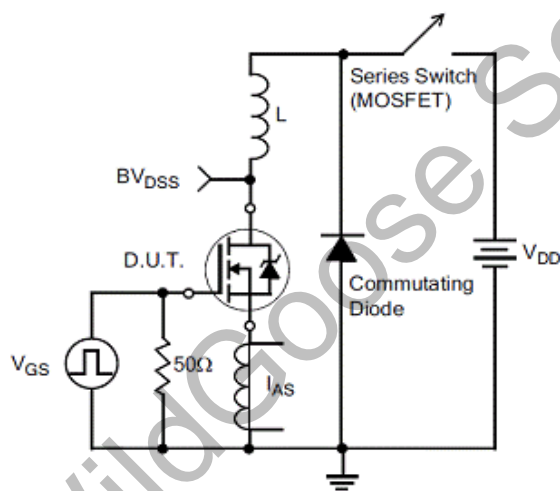


Figure20. Unclamped Inductive Switching Test Circuit

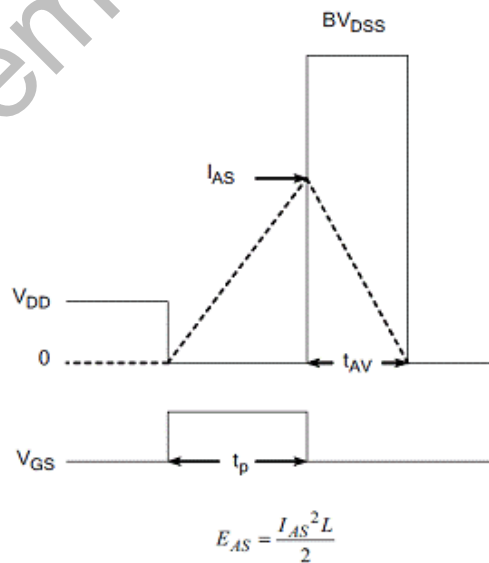
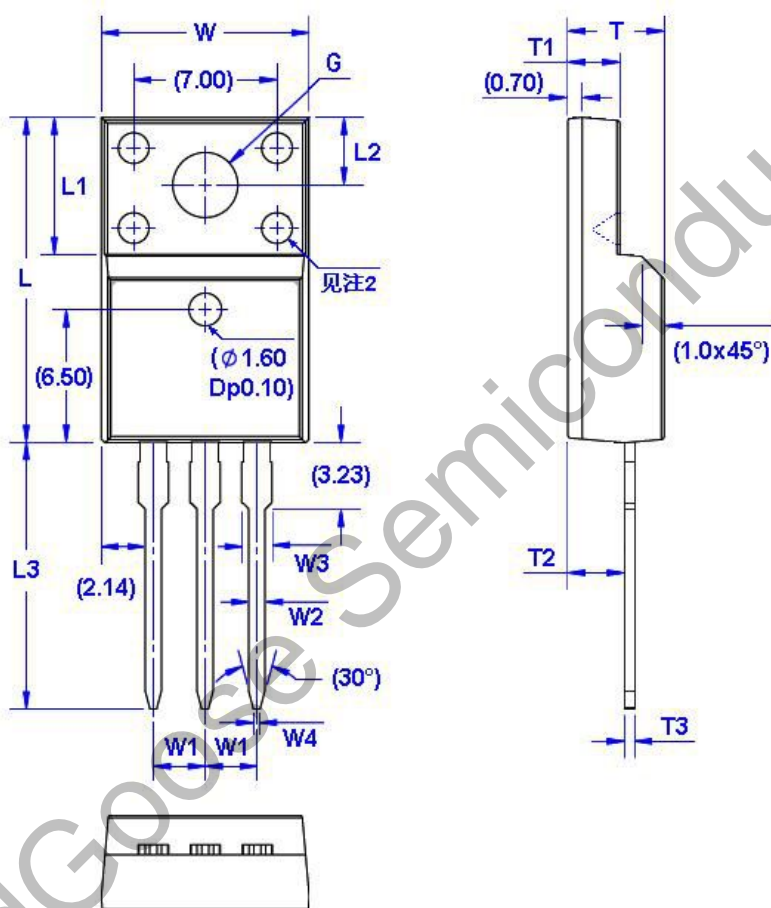


Figure21. Unclamped Inductive Switching Waveform

**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			