

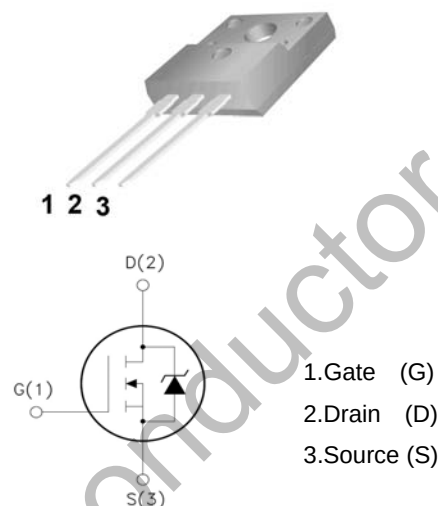


WGF9N90S

Features:

- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge: $Q_g = 60\text{nC}$ (Typ.).
- ☐ $V_{DS} = 900\text{V}$, $I_D = 9\text{A}$
- ☐ $R_{DS(on)} : 1.0\Omega$ (Max) @ $V_G = 10\text{V}$
- ☐ 100% Avalanche Tested

TO-220F



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

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	900	V
I_D	Drain Current	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
V_{GSS}	Gate - Source voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (note1)	410	mJ
I_{AR}	Avalanche Current (note2)	9	A
P_D	Power Dissipation ($T_j = 25^\circ\text{C}$)	50	W
T_j	Junction Temperature(MAX)	150	$^\circ\text{C}$
T_{stg}	Storage Temperature	$-55 \sim +150$	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	2.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	65	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0	900	-	-	V
ΔBVDSS/ΔT _J	Breakdown Voltage Temperature Coefficient	I _D =250μA ,Reference to 25°C	-	0.9	-	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =900V, V _{GS} =0V	-	-	10	μA
		V _{DS} =720V, T _c =125°C			100	
I _{GSSF}	Gate-body leakage Current, Forward	V _{GS} =+30V, V _{DS} =0V	-	-	100	nA
I _{GSSR}	Gate-body leakage Current, Reverse	V _{GS} =-30V, V _{DS} =0V	-	-	-100	
On Characteristics						
V _{GS(TH)}	Date Threshold Voltage	I _D =250μA,V _{DS} =V _{GS}	3	-	5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	I _D =4.5A,V _{GS} =10V	-	0.85	1.0	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0, f=1.0MHz	-	2630	-	pF
C _{oss}	Output Capacitance		-	190	-	
C _{rss}	Reverse Transfer Capacitance		-	18	-	
Switching Characteristics						
T _{d(on)}	Turn-On Delay Time	V _{DD} =450V, I _D =9A R _G =25Ω (Note 3,4)	-	64	110	ns
Tr	Turn-On Rise Time		-	105	250	
T _{d(off)}	Turn-Off Delay Time		-	155	210	
T _f	Turn-Off Rise Time		-	84	160	
Q _g	Total Gate Charge	V _{DS} =720,V _{GS} =10V, I _D =9A	-	60	-	nC
Q _{gs}	Gate-Source Charge		-	13	-	
Q _{gd}	Gate-Drain Charge		-	27	-	
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Max. Diode Forward Current	-	-	-	9	A
I _{SM}	Max. Pulsed Forward Current	-	-	-	36	
V _{SD}	Diode Forward Voltage	I _D =9A	-	-	1.4	V
T _{rr}	Reverse Recovery Time	I _S =9A,V _{GS} =0V diF/dt=100A/μs	-	575	-	nS
Q _{rr}	Reverse Recovery Charge		-	9.9	-	μC

Notes : 1, L=20.8mH, I_{AS}=9A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C

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

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

4, Essentially Independent of Operating Temperature

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

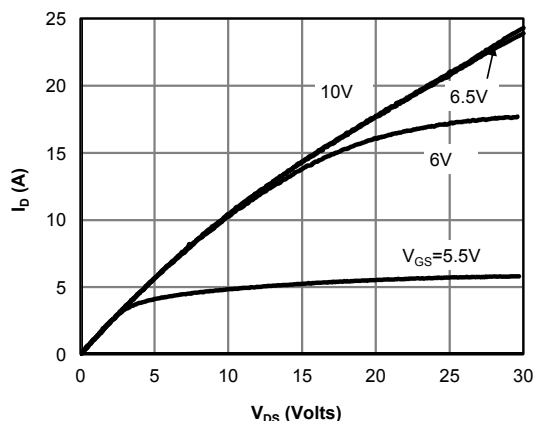


Fig 1: On-Region Characteristics

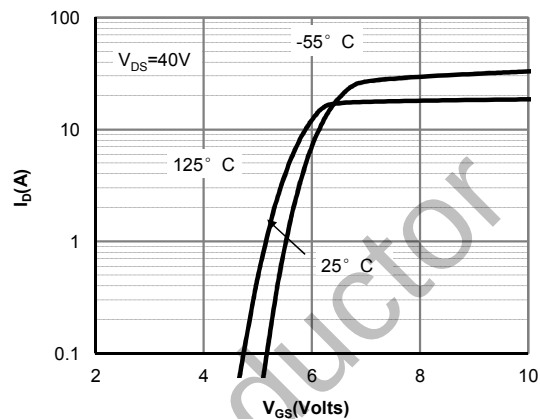


Figure 2: Transfer Characteristics

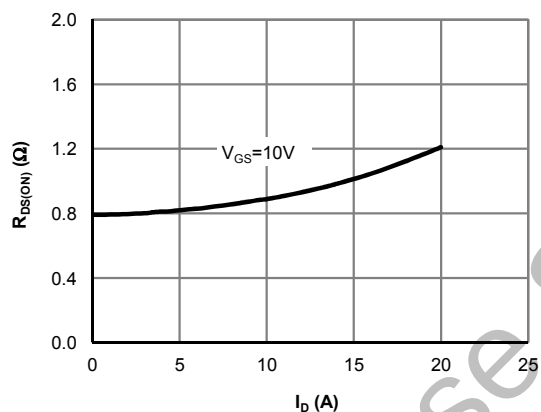


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

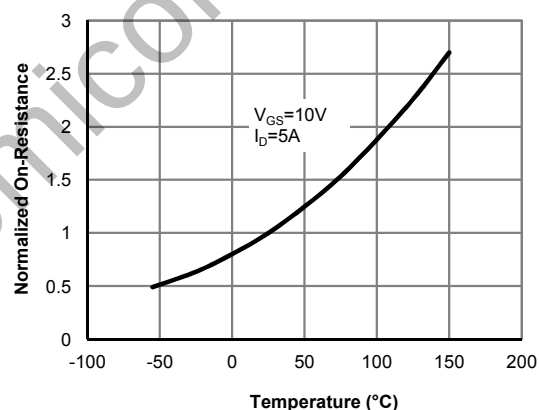


Figure 4: On-Resistance vs. Junction Temperature

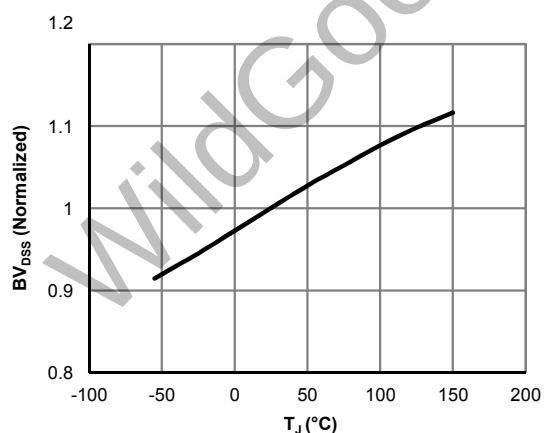


Figure 5: Break Down vs. Junction Temperature

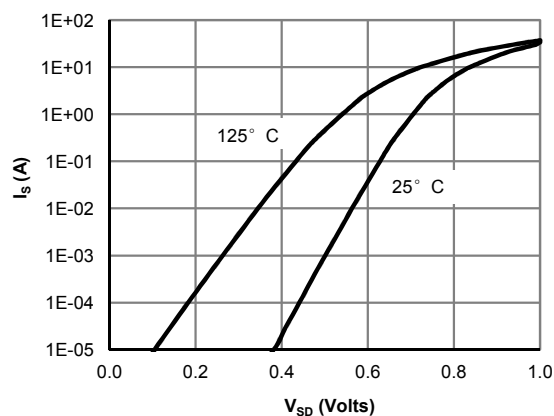
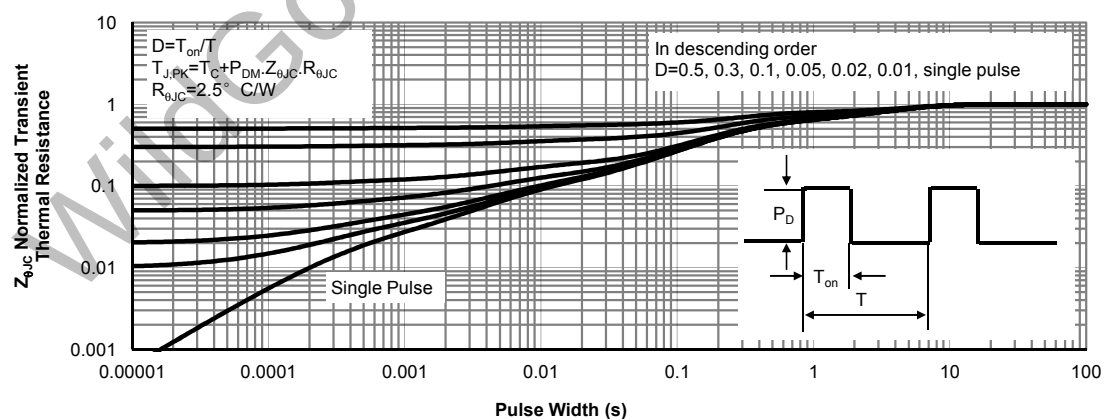
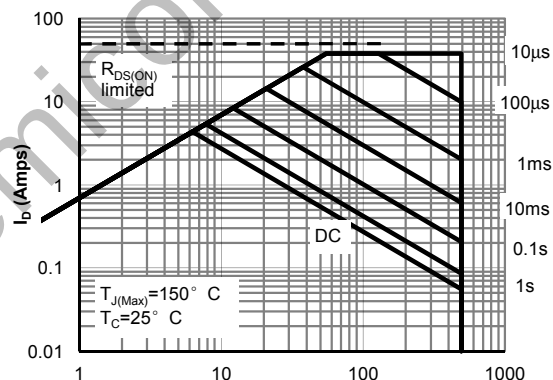
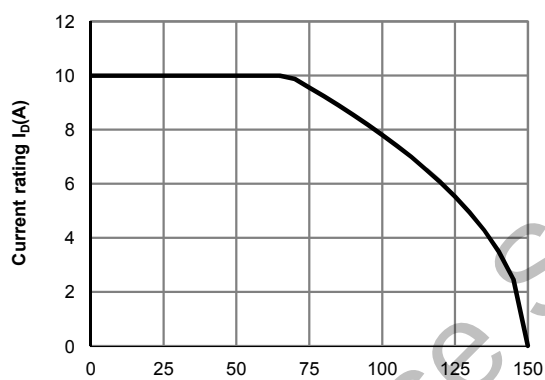
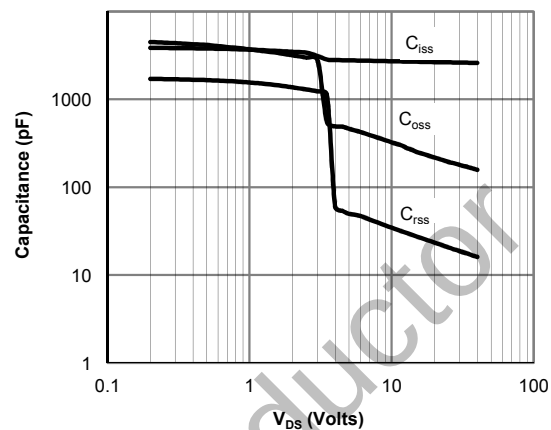
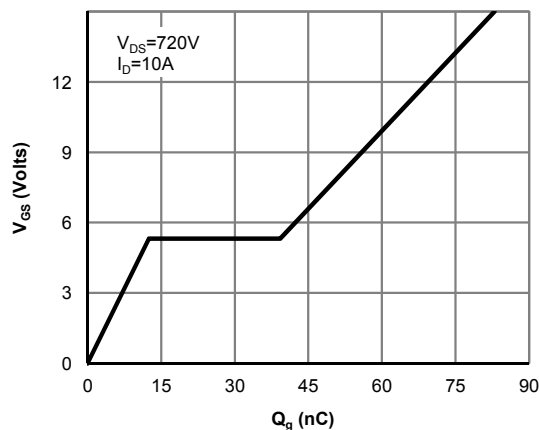
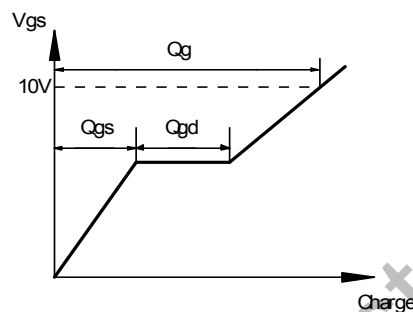
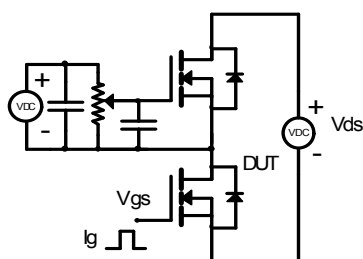


Figure 6: Body-Diode Characteristics (Note E)

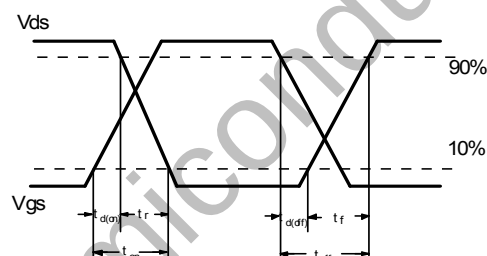
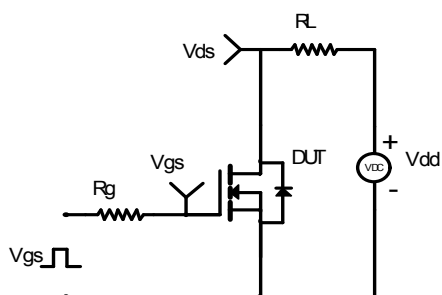
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



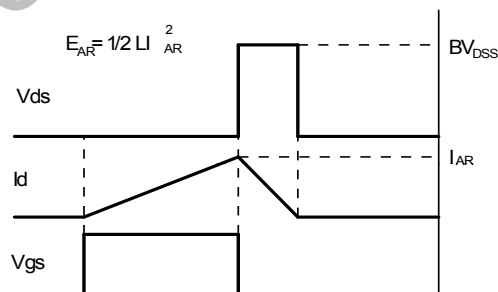
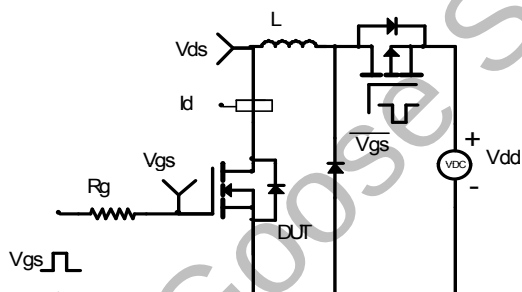
Gate Charge Test Circuit & Waveform



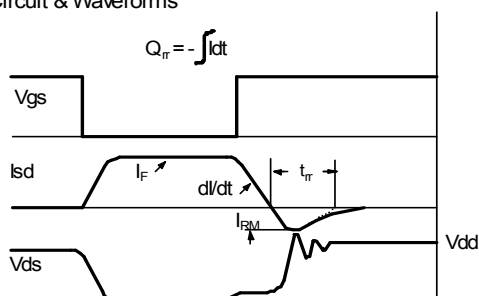
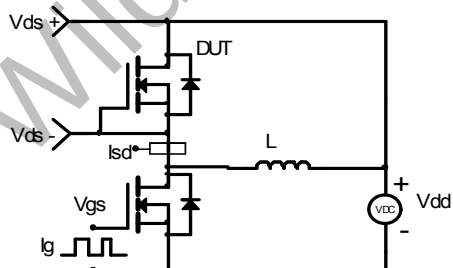
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



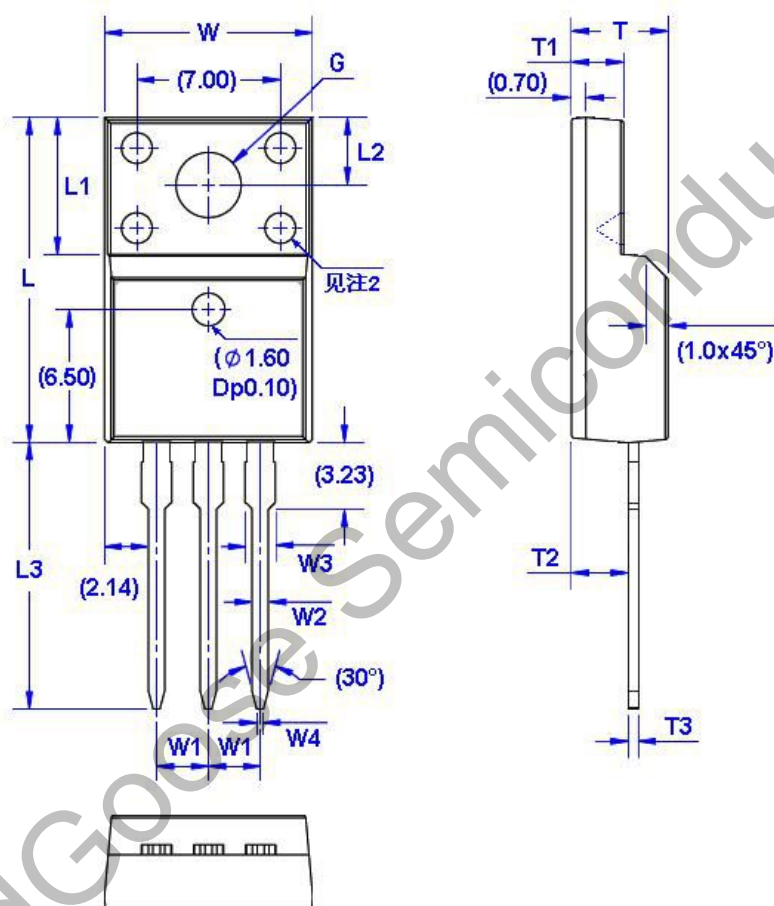
Diode Recovery Test Circuit & Waveforms



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			