

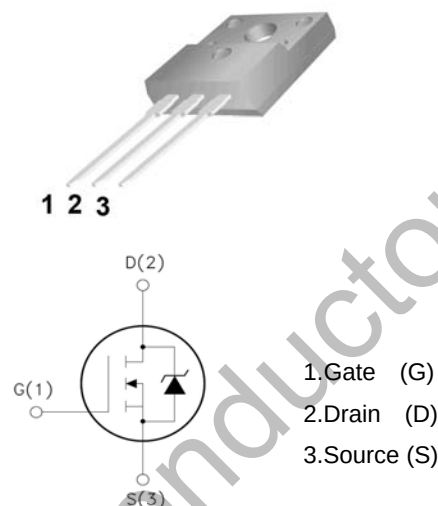


WGF10N20

Features

- ☐ Low Intrinsic Capacitances
- ☐ Excellent Switching Characteristics
- ☐ Extended Safe Operating Area
- ☐ Unrivalled Gate Charge : 22 nC (Typ.)
- ☐ BVDSS=200V, ID=10A
- ☐ Lower $R_{DS(on)}$: 0.4 Ω (Max) @VG=10V
- ☐ 100% Avalanche Tested

TO-220F



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

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	200	V
I_D	Drain Current	$T_j=25^\circ\text{C}$	A
		$T_j=100^\circ\text{C}$	
$V_{GS(TH)}$	Gate Threshold Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (note1)	160	mJ
I_{AR}	Avalanche Current (note2)	9.0	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~+150	$^\circ\text{C}$
TL	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	-	62.5	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	ID=250 μ A, VGS=0	200	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Confficient	I _D =250 μ A ,Reference to 25℃	--	0.55	--	V/℃
IDSS	Zero Gate Voltage Drain Current	Vds=200V, Vgs=0V	--	--	1	μ A
		Vds=160V, Tc=125℃			10	μ A
IGSSF	Gate-body leakage Current, Forward	Vgs=+30V, Vds=0V	--	--	100	nA
IGSSR	Gate-body leakage Current, Reverse	Vgs=-30V, Vds=0V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Date Threshold Voltage	Id=250uA,Vds=Vgs	2	--	4	V
R _{DS(on)}	Static Drain-Source On-Resistance	Id=5A,Vgs=10V	--	--	0.4	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=25V, VGS=0, f=1.0MHz	--	710	-	pF
Coss	Output Capacitance		--	85	-	pF
Crss	Reverse Transfer Capacitance		--	22	-	pF
Switching Characteristics						
Td(on)	Turn-On Delay Time	VDD=100V, ID=10A, RG=25 Ω (Note 3,4)	--	11	25	nS
Tr	Turn-On Rise Time		--	70	140	nS
Td(off)	Turn-Off Delay Time		--	60	120	nS
Tf	Turn-Off Fall Time		--	65	130	nS
Qg	Total Gate Charge	VDS=160,VGS=10V, ID=10A (Note 3,4)	--	22	30	nC
Qgs	Gate-Source Charge		--	4	--	nC
Qgd	Gate-Drain Charge			11	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximun Continuous Drain-Source Diode Forward Current		--	--	10	A
I _{SM}	Maximun Plused Drain-Source DiodeForwad Current		--	--	40	A
V _{SD}	Drain-Source Diode Forward Voltage	Id=10A	--	--	1.45	V
trr	Reverse Recovery Time	I _S =10A,V _{GS} =0V di _f /	--	140	--	nS
Qrr	Reverse Recovery Charge	dt=100A/ μ S (Note3)	--	2.2	--	μ C
*Notes 1, L=8mH, IAS=10A, VDD=50V, RG=25Ω, Starting T _J =25℃ 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 Characteristics

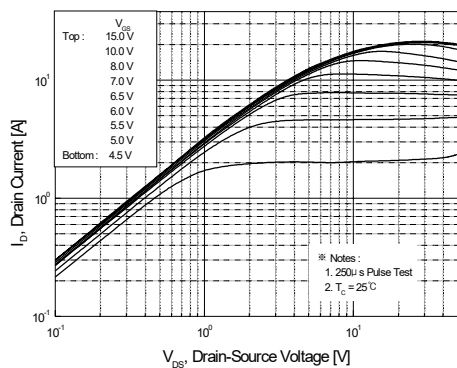


Figure 1. On-Region Characteristics

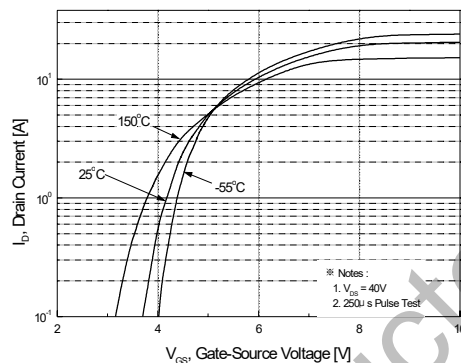


Figure 2. Transfer Characteristics

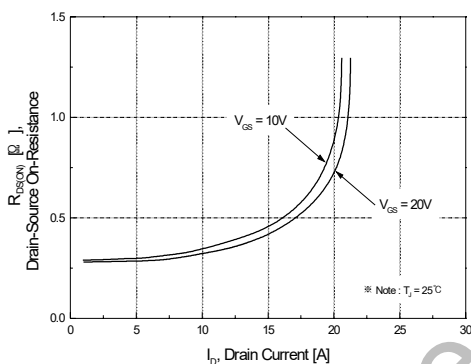


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

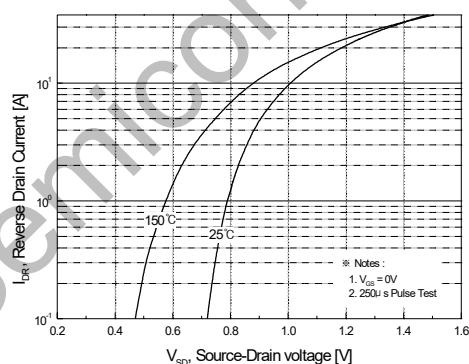


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

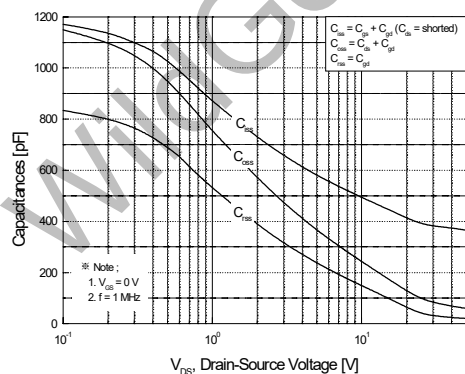


Figure 5. Capacitance Characteristics

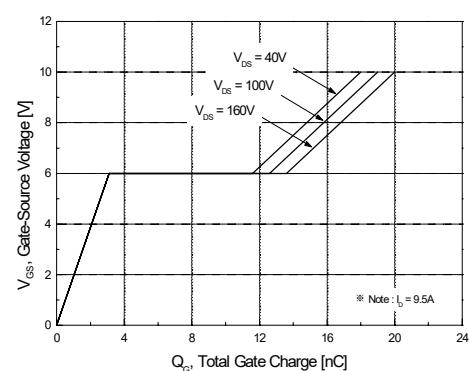


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

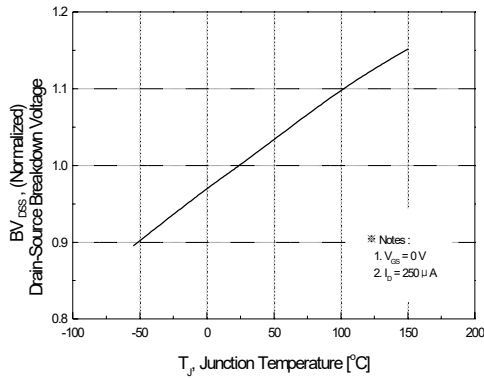


Figure 7. Breakdown Voltage Variation vs Temperature

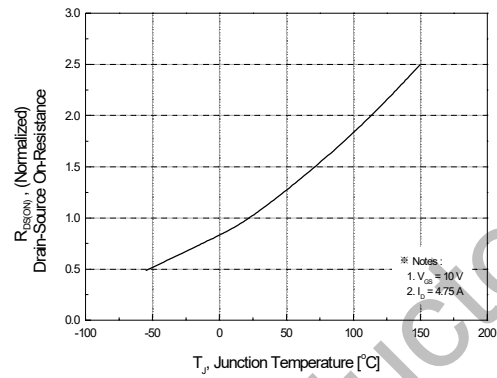


Figure 8. On-Resistance Variation vs Temperature

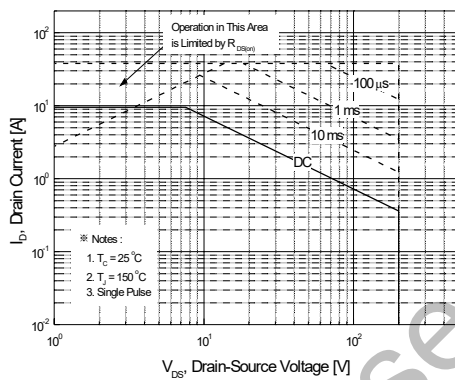


Figure 9-1. Maximum Safe Operating Area

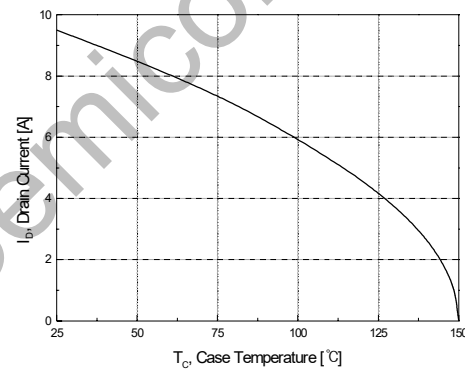


Figure 10. Maximum Drain Current vs Case Temperature

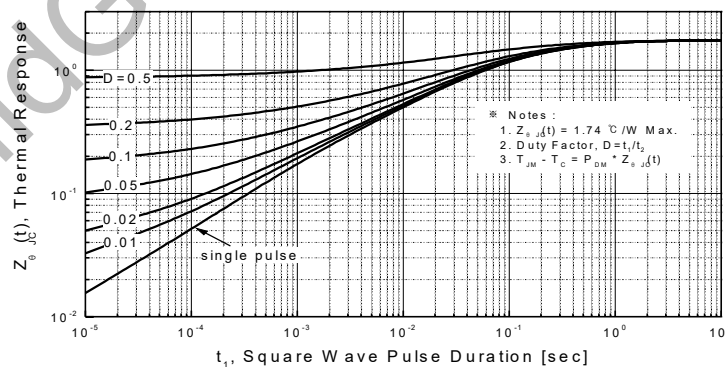
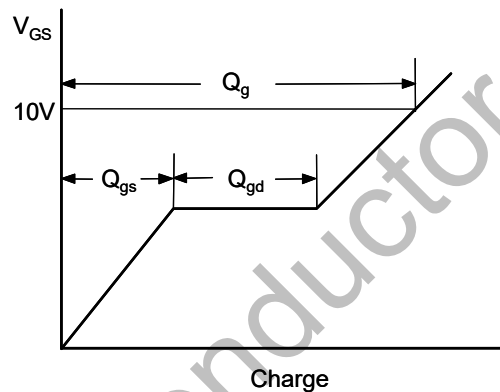
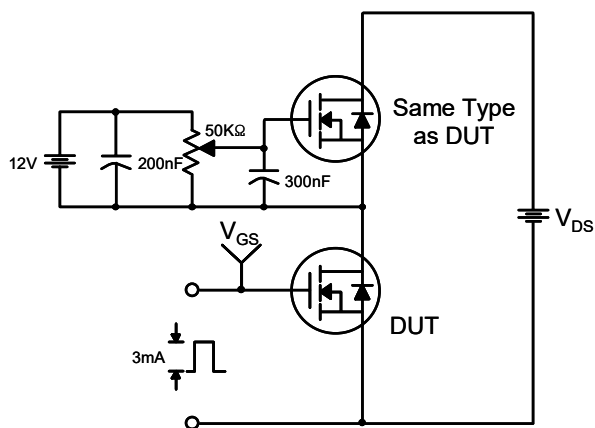
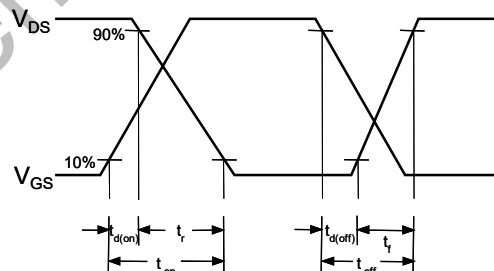
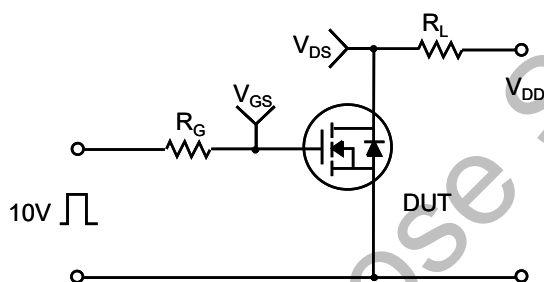


Figure 11-1. Transient Thermal Response Curve

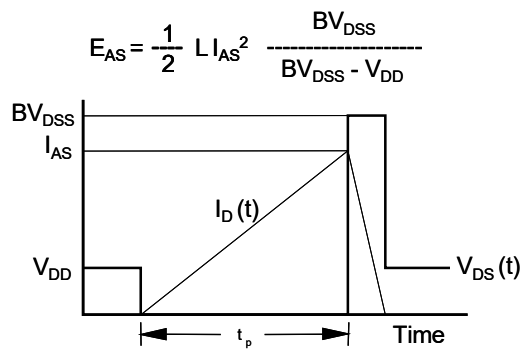
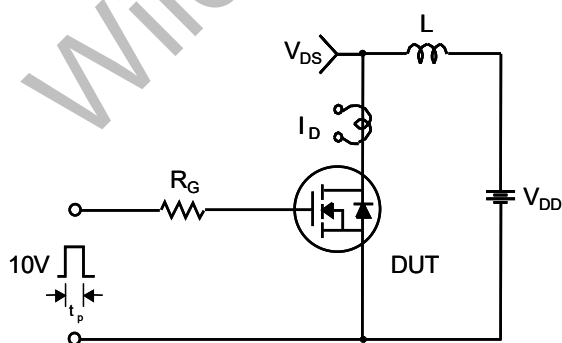
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



The diagram shows a switching circuit. A MOSFET driver is connected to the gate of a MOSFET labeled DUT. The driver's gate is driven by a square wave V_{GS} through a resistor R_G . The DUT's gate is connected to the driver's drain. The DUT's source is connected to ground, and its drain is connected to a load inductor L in series with a DC supply V_{DD} . The drain current is labeled I_{SD} . The drain-source voltage is labeled V_{DS} . A note indicates that the driver MOSFET is the same type as the DUT. A list of characteristics is provided:

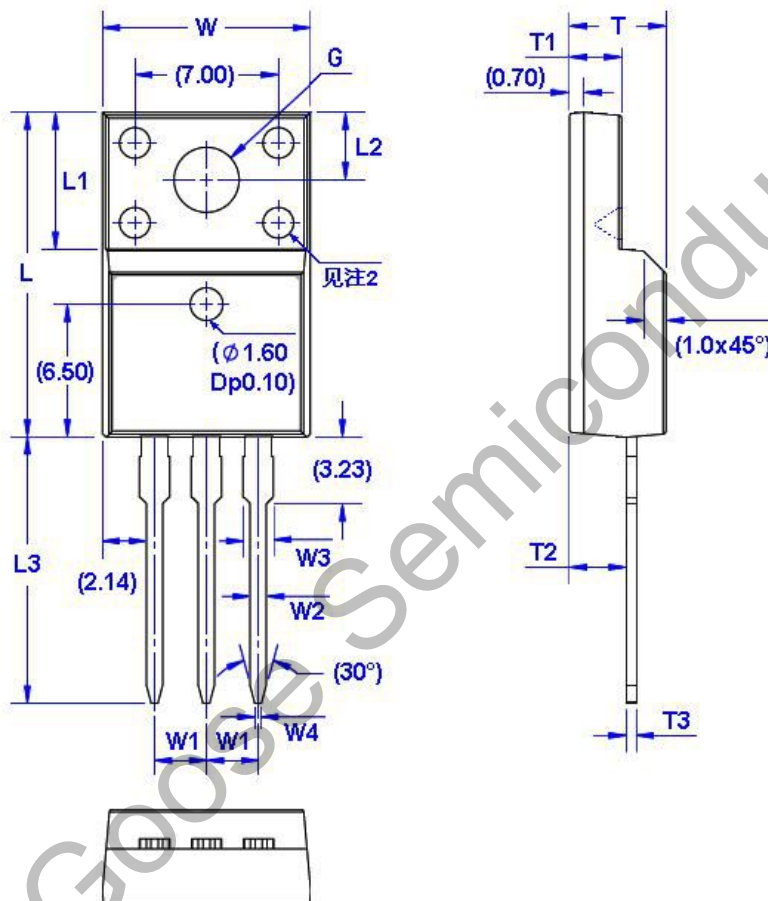
- dv/dt controlled by R_G
- I_{SD} controlled by pulse period



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			