
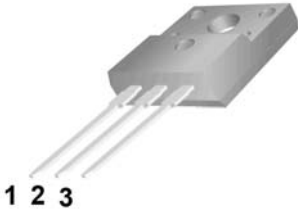
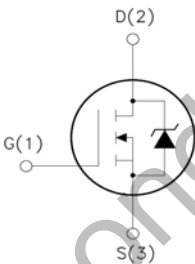
 <p style="font-size: 1.2em; font-weight: bold; margin-top: 10px;">WGF13N50SE</p> <p><b>Features:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Low Intrinsic Capacitances</li> <li><input type="checkbox"/> Excellent Switching Characteristics</li> <li><input type="checkbox"/> Extended Safe Operating Area</li> <li><input type="checkbox"/> Unrivalled Gate Charge :Qg= 50nC (Typ.)</li> <li><input type="checkbox"/> BVDSS=500V, ID=13A</li> <li><input type="checkbox"/> R<sub>DS(on)</sub> :0.50Ω (Max) @VG=10V</li> <li><input type="checkbox"/> 100% Avalanche Tested</li> </ul>	<div style="text-align: right;">  </div> <p style="text-align: center; font-weight: bold;">TO-220F</p>   <div style="margin-left: 750px;"> <p>1.Gate (G)</p> <p>2.Drain (D)</p> <p>3.Source (S)</p> </div>
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**Absolute Maximum Ratings** (Ta=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain-Source Voltage	500	V
I <sub>D</sub>	Drain Current	T <sub>j</sub> =25°C	13
		T <sub>j</sub> =100°C	7.9
V <sub>GS(TH)</sub>	Gate Threshold Voltage	±30	V
E <sub>AS</sub>	Single Pulse Avalanche Energy (note1)	500	mJ
I <sub>AR</sub>	Avalanche Current (note2)	13	A
P <sub>D</sub>	Power Dissipation (T <sub>j</sub> =25°C)	50	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	-	2.50	°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	500	-	-	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> =250μA, Reference to 25°C	-	0.65	-	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =400V, 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> =6.5A, V <sub>GS</sub> =10V	-	0.45	0.50	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0, f=1.0MHz	-	1680	-	pF
C <sub>oss</sub>	Output Capacitance		-	120	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	12	-	
<b>Switching Characteristics</b>						
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =250V, I <sub>D</sub> =13A R <sub>G</sub> =25Ω (Note 3,4)	-	40	-	nS
T <sub>r</sub>	Turn-On Rise Time		-	140	-	
T <sub>d(off)</sub>	Turn-Off Delay Time		-	125	-	
T <sub>f</sub>	Turn-Off Rise Time		-	85	-	
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =400V, V <sub>GS</sub> =10V, I <sub>D</sub> =13A (Note 3,4)	-	50	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	9.8	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	18.5	-	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Max. Diode Forward Current	-	-	-	13	A
I <sub>SM</sub>	Max. Pulsed Forward Current	-	-	-	52	
V <sub>SD</sub>	Diode Forward Voltage	I <sub>D</sub> =13A	-	-	1.4	V
T <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =13A, V <sub>GS</sub> =0V diF/dt=100A/μs	-	420	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge	(Note3)	-	4.2	-	μC

- Notes : 1, L=17.1mH, I<sub>AS</sub>=13A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, 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%  
 4, Essentially Independent of Operating Temperature

Typical Characteristics

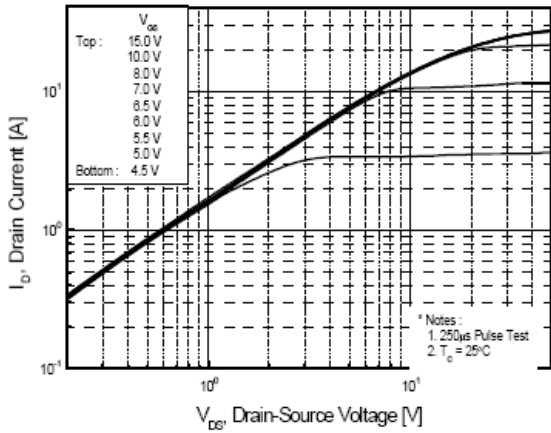


Fig1 Typical Output Characteristics, Tc=25°C

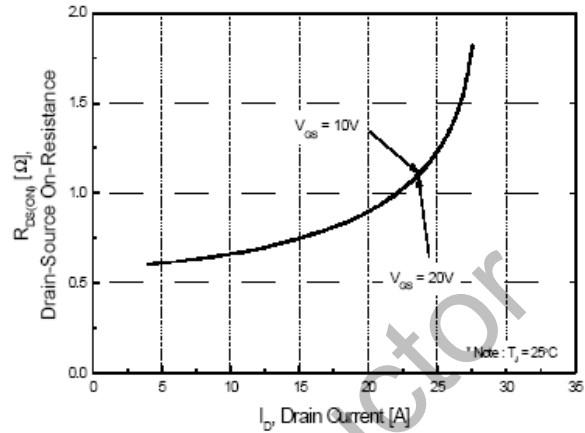


Fig2 On-Resistance Vs. Drain Current and Gate Voltage

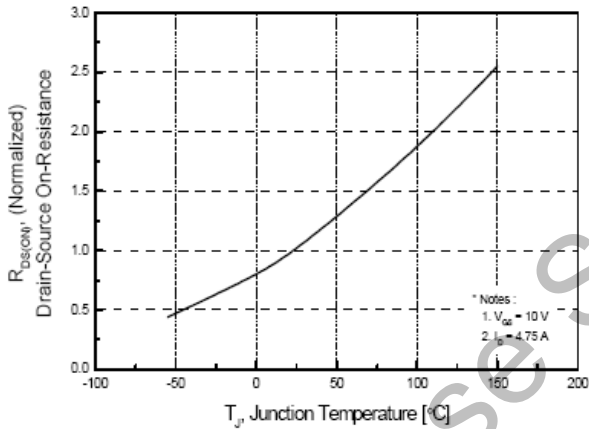


Fig3 Normalized On-Resistance Vs. Temperature

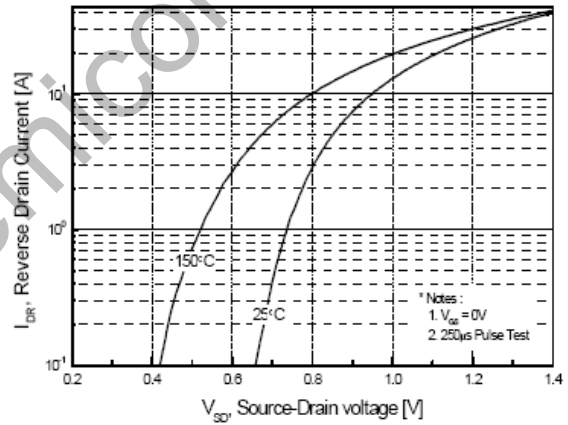


Fig4 Typical Source-Drain Diode Forward Voltage

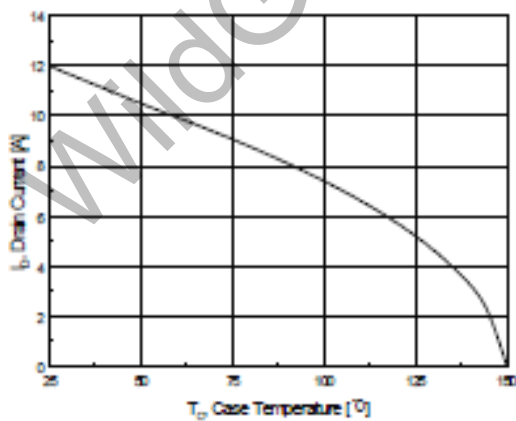


Fig5 Maximum Drain Current Vs. Case Temperature

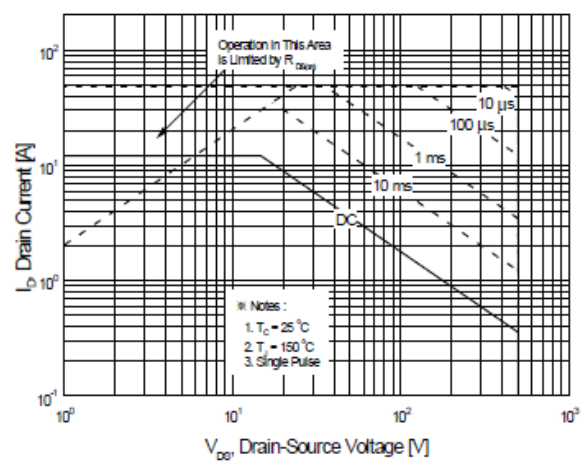
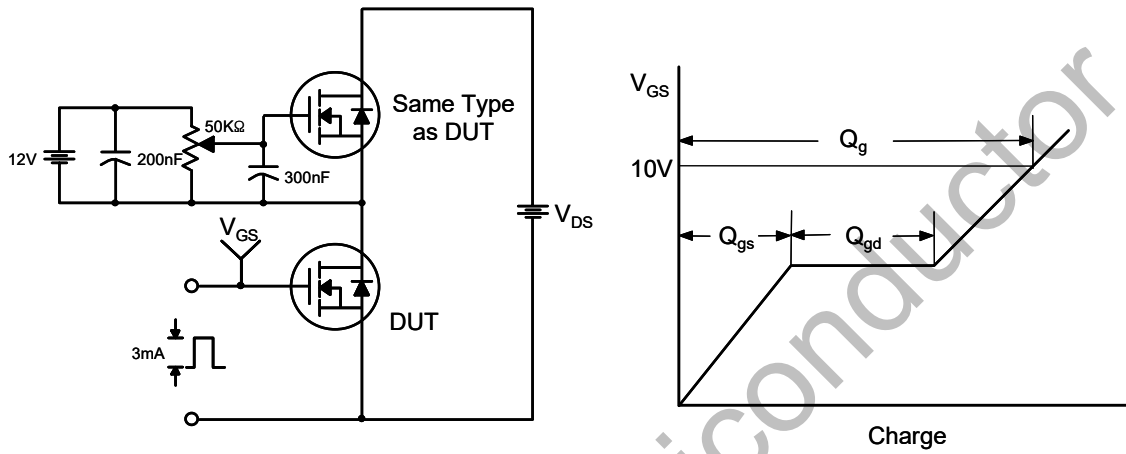
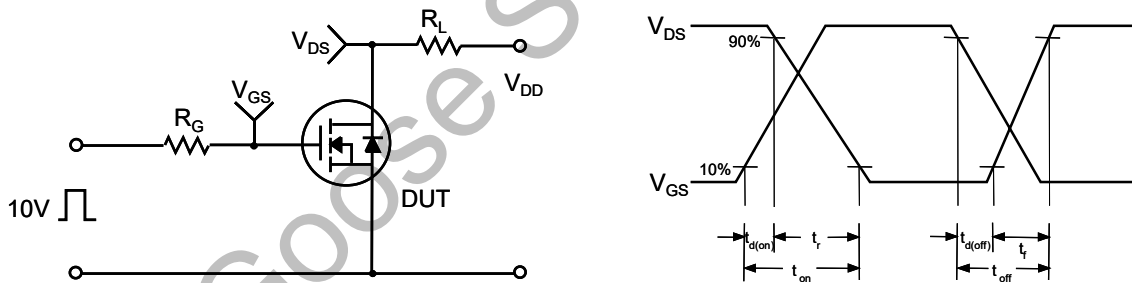


Fig6 Maximum Safe Operating Area

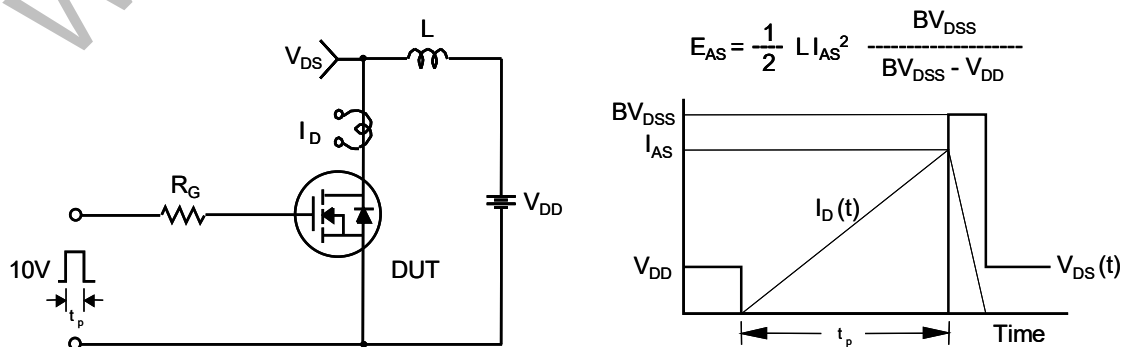
Gate Charge Test Circuit & Waveform



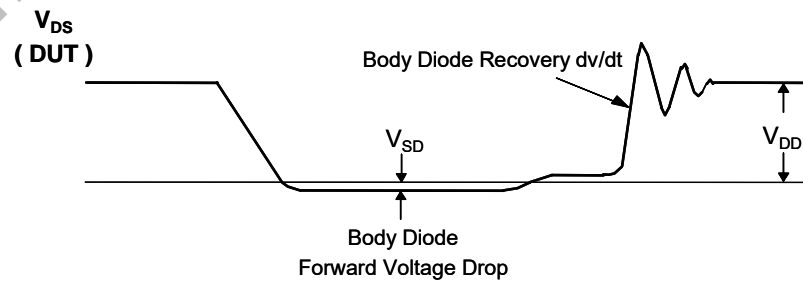
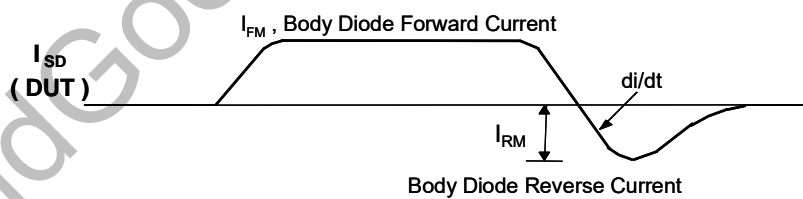
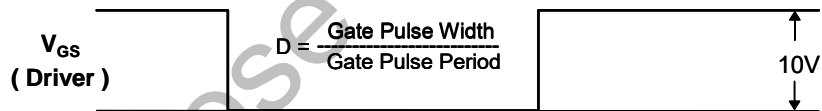
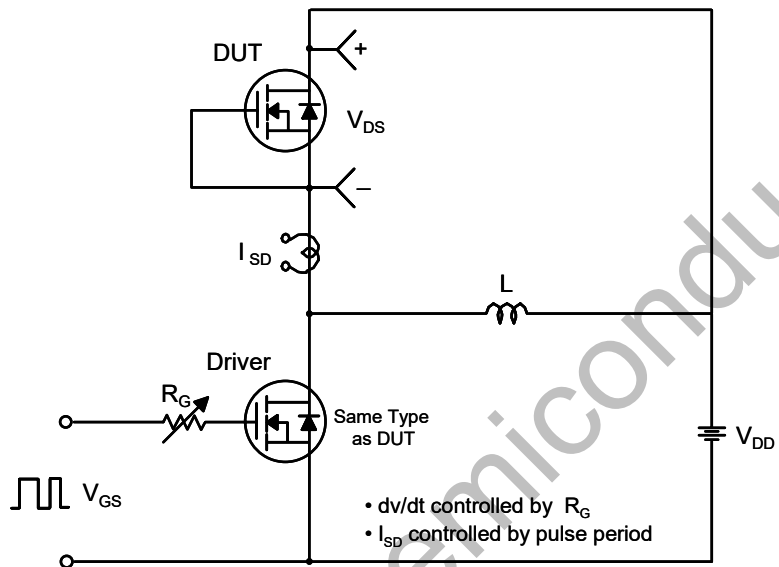
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



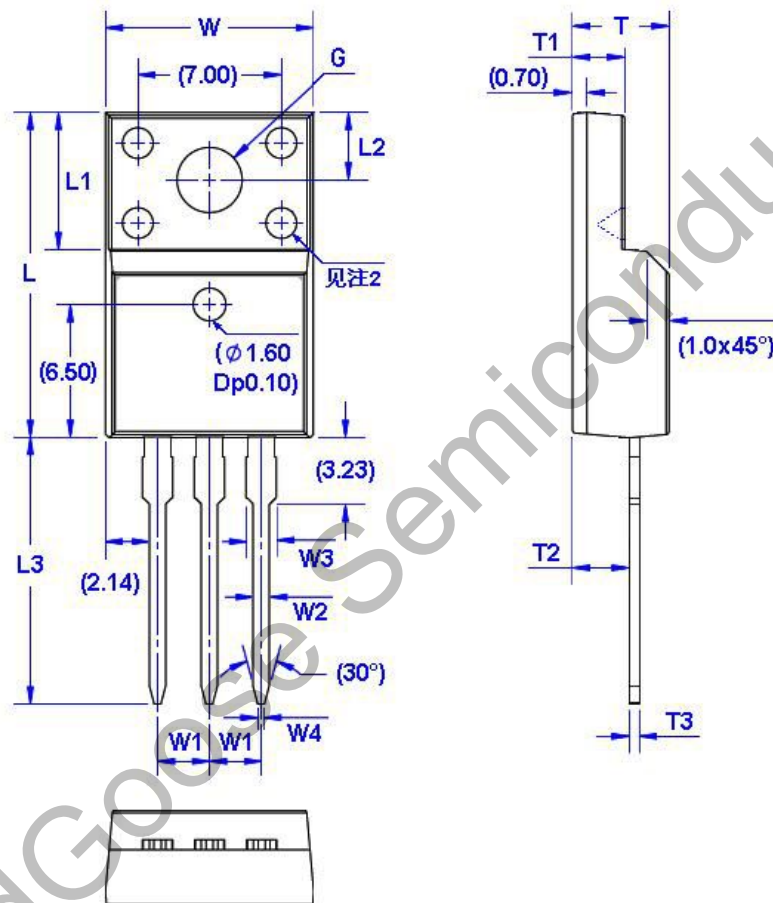
Peak Diode Recovery dv/dt Test Circuit & Waveforms



**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			

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