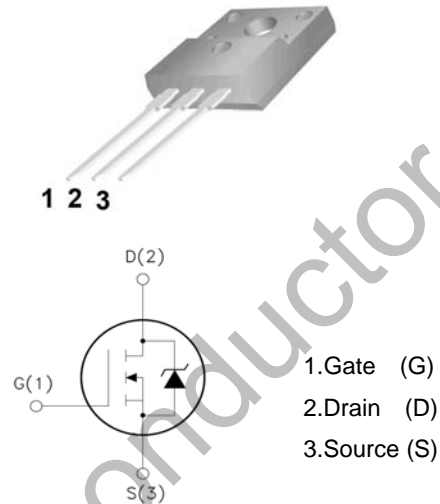## Features

☐ Low Intrinsic Capacitances

☐ Excellent Switching Characteristics

☐ Extended Safe Operating Area

☐ Unrivalled Gate Charge :Qg= 8.5nC (Typ.)

☐ BVDSS=600V,ID=2A

☐ $R_{DS(on)}$: 5.0Ω (Max) @VG=10V

☐ 100% Avalanche Tested

TO-220F

RoHS COMPLIANT

1 2 3

D(2)

G(1)

S(3)

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

Absolute Maximum Ratings (Ta=25℃ unless otherwise noted)

Symbol	Parameter	WGF2N60SE	Units
V_{DSS}	Drain-Sourse Voltage	600	V
I_D	Drain Current -continuous (Tc=25℃)	2*	A
	-continuous (Tc=100℃)	1.5*	A
V_{GS}	Gate-Sourse Voltage	±30	V
E_{AS}	Single Plused Avanche Energy	120	mJ
I_{AR}	Avalanche Current	2	A
P_D	Power Dissipation (Tc=25℃)	20	W
T_J,T_{STG}	Operating and Storage Temperature Range	-55 ~ +150	℃
TL	Maximum lead temperature for soldering purpose,1/8" from case for 5 seconds	300	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max	Units
$R_{θJC}$	Thermal Resistance,Junction to Case	--	4.46	℃/W
$R_{θJA}$	Thermal Resistance,Junction to Ambient	--	62.5	℃/W

* Drain current limited by maximum junction temperature.

Electrical Characteristics Tc=25℃ unless other wise noted

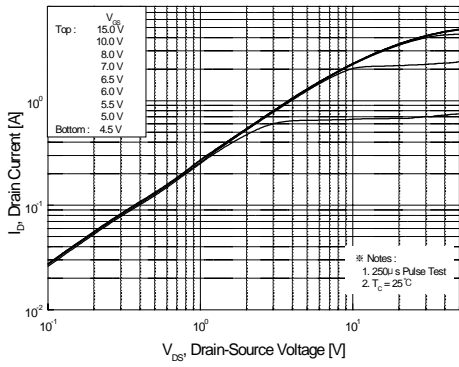| Symbol	Parameter	Test Condition	Min.	Typ.	Max	Units
Off Characteristics						
BV$_{DSS}$	Drain-Sourse Breakdown Voltage	ID=250μA，VGS=0	600	--	--	V
△BV$_{DSS}$/ △T$_J$	Breakdown Voltage Temperature Conficient	I$_D$=250μA,Reference to 25℃	--	0.4	--	V/℃
IDSS	Zero Gate Voltage Drain Current	Vds=600V, Vgs=0V	--	--	1	μA
		Vds=480V, Tc=125℃			10	μA
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-Sourse On-Resistance	Id=1A,Vgs=10V	--	--	5.0	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=25V，VGS=0, f=1.0MHz	--	270	350	pF
Coss	Output Capacitance		--	40	50	pF
Crss	Reverse Transfer Capacitance		--	5	7	pF
Switching Characteristics						
Td(on)	Turn-On Delay Time	VDD=300V，ID=2A RG=25Ω	--	10	30	nS
Tr	Turn-On Rise Time		--	25	60	nS
Td(off)	Turn-Off Delay Time		--	20	50	nS
Tf	Turn-Off Fall Time		--	25	60	nS
Qg	Total Gate Charge	VDS=480,VGS=10V, ID=2A (	--	90	11	nC
Qgs	Gate-Source Charge		--	1.6	--	nC
Qgd	Gate-Drain Charge			4.3	--	nC
Drain-Sourse Diode Characteristics and Maximum Ratings						
I$_S$	Maximun Continuous Drain-Sourse Diode Forward Current		--	--	2	A
I$_{SM}$	Maximun Plused Drain-Sourse DiodeForwad Current		--	--	8	A
V$_{SD}$	Drain-Sourse Diode Forward Voltage	Id=2A	--	--	1.5	V
trr	Reverse Recovery Time	I$_S$=2A,V$_{GS}$=0V di$_F$/dt=100A/μs	--	180	--	nS
Qrr	Reverse Recovery Charge		--	0.72	--	μC

Typical Characteristics
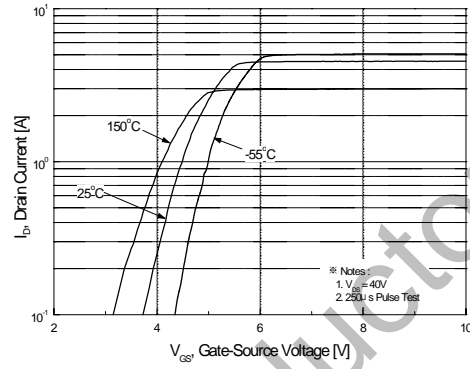

Figure 1. On-Region Characteristics
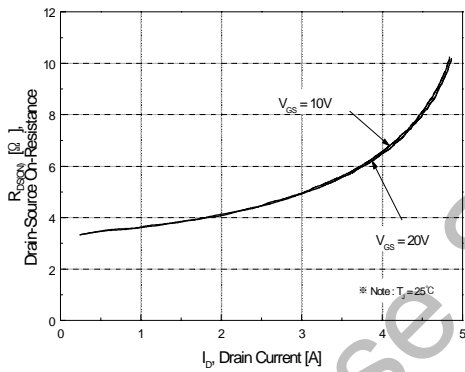

Figure 2. Transfer Characteristics

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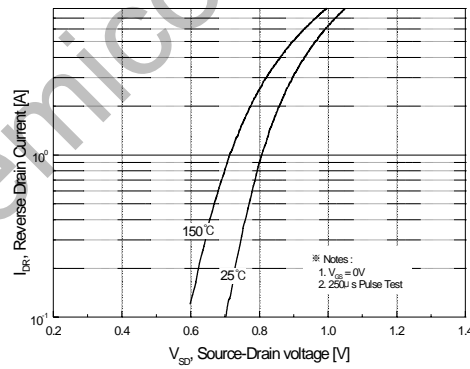

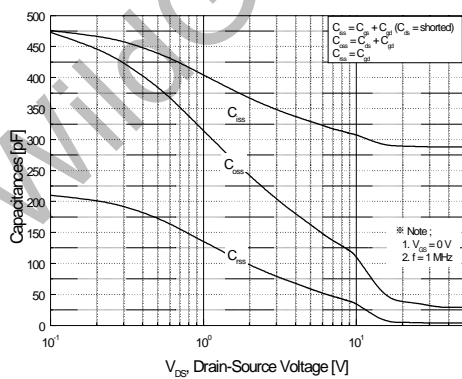Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

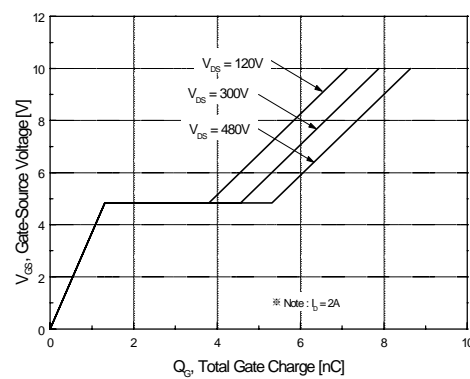Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

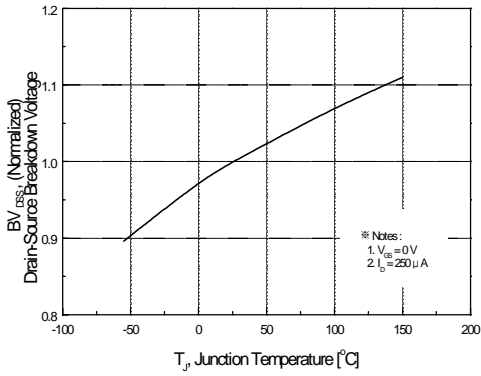## Typical Characteristics   (Continued)

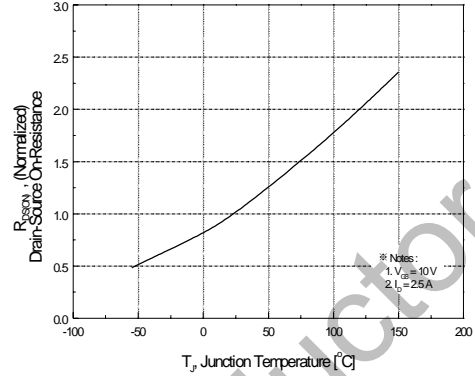Figure 7. Breakdown Voltage Variation vs Temperature

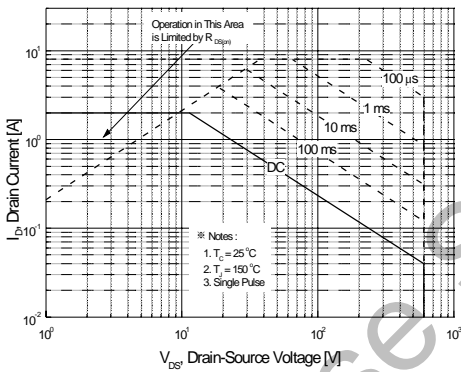Figure 8. On-Resistance Variation vs Temperature
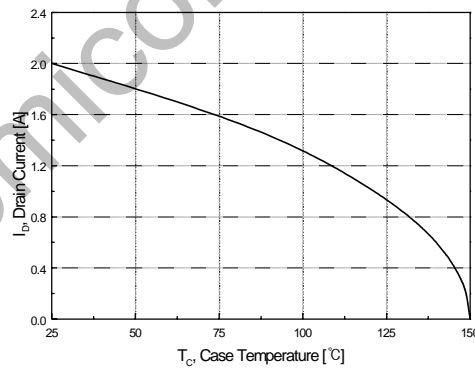

Figure 9-2. Maximum Safe Operating Area for WGF2N60S

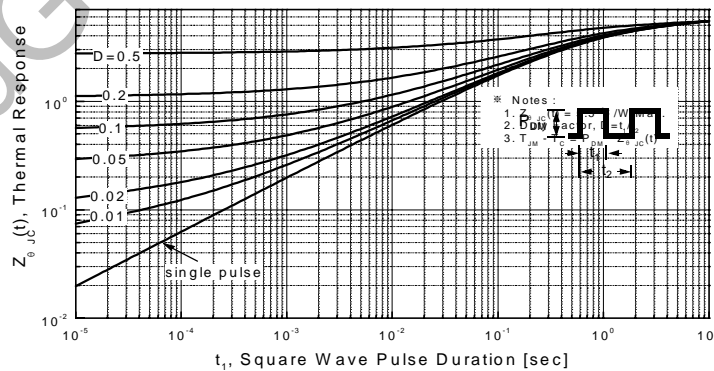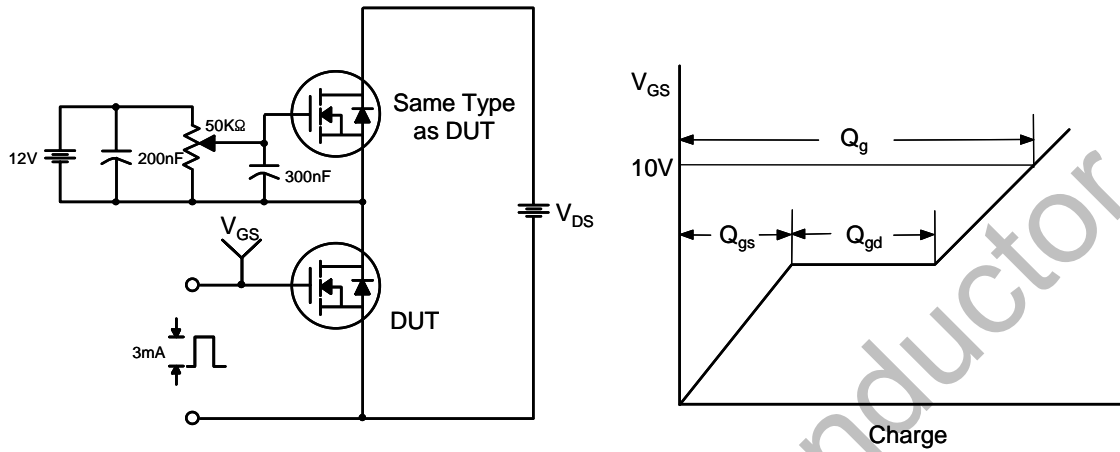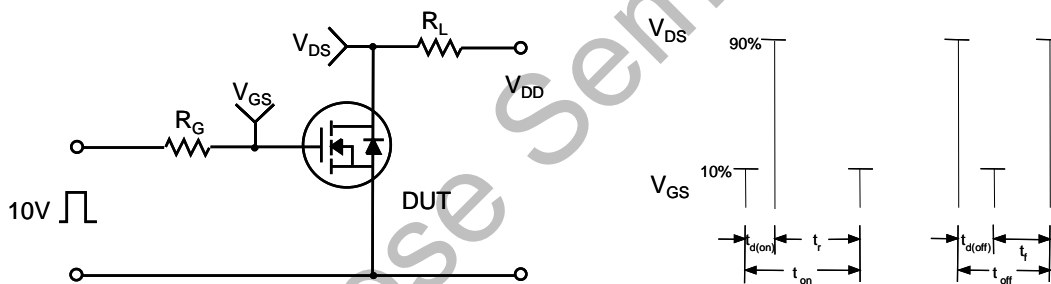Figure 10. Maximum Drain Current vs Case Temperature

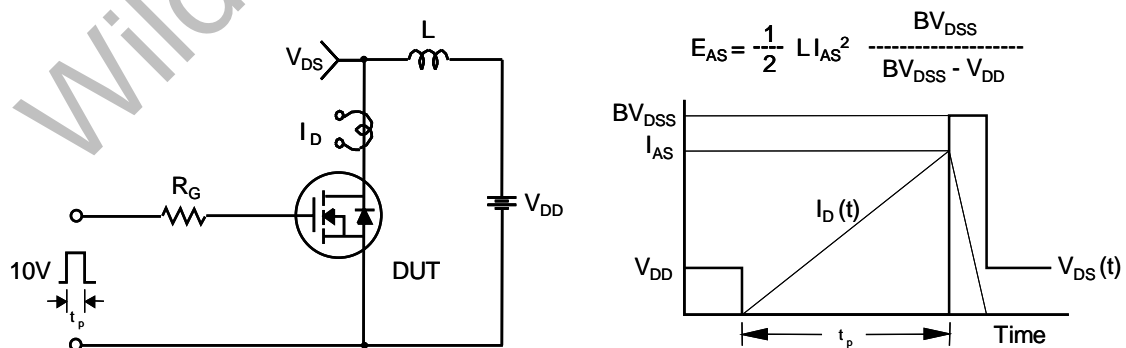

Figure 11-2. Transient Thermal Response Curve for WGF2N60S

Gate Charge Test Circuit & Waveform

12V 200nF 50KΩ 300nF Same Type as DUT

V_{GS} DUT V_{DS}

3mA

V_{GS} 10V Q_g Q_{gs} Q_{gd} Charge

Resistive Switching Test Circuit & Waveforms

V_{DS} R_L V_{DD}

R_G V_{GS} DUT

10V

V_{DS} 90%

V_{GS} 10%

$t_{d(on)}$ t_r t_{on} $t_{d(off)}$ t_f t_{off}

Unclamped Inductive Switching Test Circuit & Waveforms

V_{DS} L I_D

R_G V_{DD} DUT

10V t_p

$$E_{AS} = \frac{1}{2} L I_{AS}^2 \; \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

BV_{DSS} I_{AS} $I_D(t)$ V_{DD} $V_{DS}(t)$ t_p Time

Peak Diode Recovery dv/dt Test Circuit & Waveforms

DUT

V_{DS}

I_{SD}

L

Driver

R_G

Same Type
as DUT

V_{DD}

V_{GS}

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

V_{GS}
(Driver)

$$D = \frac{\text{Gate Pulse Width}}{\text{Gate Pulse Period}}$$

10V

I_{SD}
(DUT)

I_{FM} , Body Diode Forward Current

di/dt

I_{RM}

Body Diode Reverse Current

V_{DS}
(DUT)

Body Diode Recovery dv/dt

V_{SD}

V_{DD}

Body Diode
Forward Voltage Drop

TO-220F