



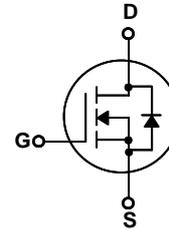
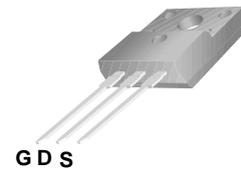
Technologies Int'l

## WFF1N60

600V N-Channel MOSFET

### Features

- Low Intrinsic Capacitances
- Excellent Switching Characteristics
- Extended Safe Operating Area
- Unrivalled Gate Charge :Qg= 5nC (Typ.)
- BVDS=600V,ID=1A
- R<sub>DS(on)</sub> : 11.5Ω (Max) @VG=10V
- 100% Avalanche Tested



TO-220F

G-Gate,D-Drain,S-Source

### Absolute Maximum Ratings *T<sub>c</sub>=25°C unless other wise noted*

Symbol	Parameter	WFF1N60	Unit
V <sub>DSS</sub>	Drain-Source Voltage	600	V
I <sub>D</sub>	Drain Current -continuous (T <sub>c</sub> =25°C)	1*	A
	-continuous (T <sub>c</sub> =100°C)	0.6*	A
V <sub>GS</sub>	Gate-Source Voltage	± 30	V
E <sub>AS</sub>	Single Pulsed Avanche Energy (Note1)	50	mJ
I <sub>AR</sub>	Avalanche Current (Note2)	1	A
P <sub>D</sub>	Power Dissipation (T <sub>c</sub> =25°C)	21	W
T <sub>J</sub> ,T <sub>STG</sub>	Operating and Storage Temperature Range	-55 ~ +150	°C
TL	Maximum lead temperature for soldering purpose,1/8" from case for 5 seconds	300	°C

### Thermal Characteristics

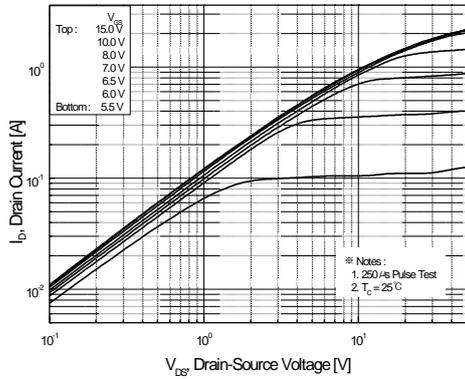
Symbol	Parameter	Typ.	Max	Units
R <sub>θJC</sub>	Thermal Resistance,Junction to Case	--	5.95	°C/W
R <sub>θJA</sub>	Thermal Resistance,Junction to Ambient	--	62.5	°C/W

\* Drain current limited by maximum junction temperature.

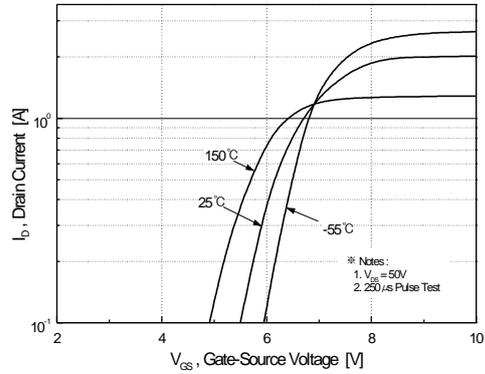
**Electrical Characteristics**  $T_c=25^{\circ}\text{C}$  unless other wise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\ \mu\text{A}$ , $V_{GS}=0$	600	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\ \mu\text{A}$ , Reference to $25^{\circ}\text{C}$	--	0.4	--	$\text{V}/^{\circ}\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{ds}=600\text{V}$ , $V_{gs}=0\text{V}$	--	--	1	$\mu\text{A}$
		$V_{ds}=480\text{V}$ , $T_c=125^{\circ}\text{C}$			10	$\mu\text{A}$
$I_{GSSF}$	Gate-body leakage Current, Forward	$V_{gs}=+30\text{V}$ , $V_{ds}=0\text{V}$	--	--	100	nA
$I_{GSSR}$	Gate-body leakage Current, Reverse	$V_{gs}=-30\text{V}$ , $V_{ds}=0\text{V}$	--	--	-100	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$I_D=250\ \mu\text{A}$ , $V_{ds}=V_{gs}$	2	--	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=0.5\text{A}$ , $V_{gs}=10\text{V}$	--	--	11.5	$\Omega$
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=25\text{V}$ , $V_{GS}=0$ , $f=1.0\text{MHz}$	--	120	150	pF
$C_{oss}$	Output Capacitance		--	20	25	pF
$C_{rss}$	Reverse Transfer Capacitance		--	3	4	pF
<b>Switching Characteristics</b>						
$T_d(on)$	Turn-On Delay Time	$V_{DD}=300\text{V}$ , $I_D=1\text{A}$ $R_G=25\ \Omega$ (Note 3,4)	--	5	20	nS
$T_r$	Turn-On Rise Time		--	25	60	nS
$T_d(off)$	Turn-Off Delay Time		--	7	25	nS
$T_f$	Turn-Off Fall Time		--	25	60	nS
$Q_g$	Total Gate Charge	$V_{DS}=480$ , $V_{GS}=10\text{V}$ , $I_D=1\text{A}$ (Note 3,4)	--	5	6	nC
$Q_{gs}$	Gate-Source Charge		--	1	--	nC
$Q_{gd}$	Gate-Drain Charge			2.6	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current		--	--	1	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current		--	--	3.6	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$I_D=2\text{A}$	--	--	1.4	V
$t_{rr}$	Reverse Recovery Time	$I_S=2\text{A}$ , $V_{GS}=0\text{V}$	--	160	--	nS
$Q_{rr}$	Reverse Recovery Charge	$di_f/dt=100\text{A}/\mu\text{s}$ (Note3)	--	0.3	--	$\mu\text{C}$
*Notes	1, $L=55\text{mH}$ , $I_{AS}=1.0\text{A}$ , $V_{DD}=50\text{V}$ , $R_G=25\ \Omega$ , Starting $T_J=25^{\circ}\text{C}$ 2, Repetitive Rating : Pulse width limited by maximum junction temperature 3, Pulse Test : Pulse Width $\leq 300\ \mu\text{s}$ , Duty Cycle $\leq 2\%$ 4, Essentially Independent of Operating Temperature					

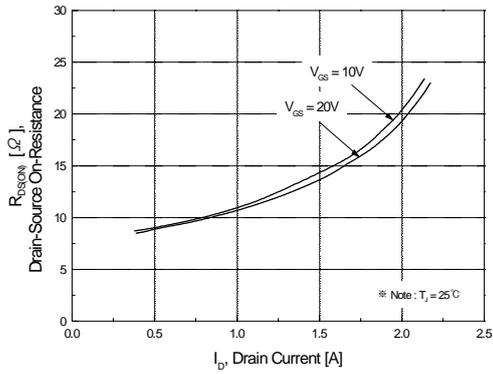
# Typical Characteristics



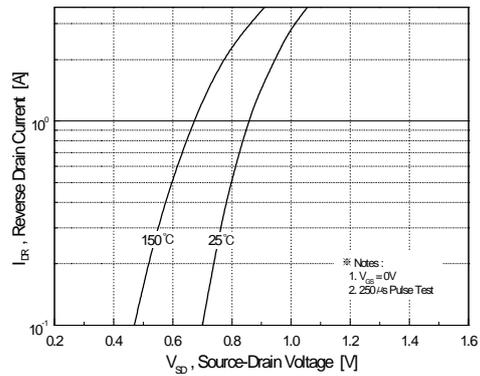
**Figure 1. On-Region Characteristics**



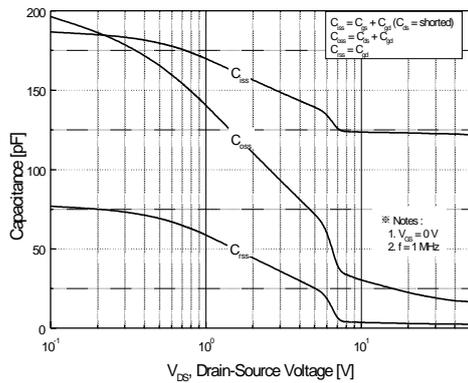
**Figure 2. Transfer Characteristics**



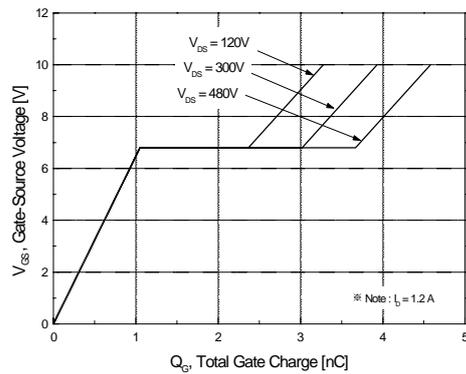
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



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

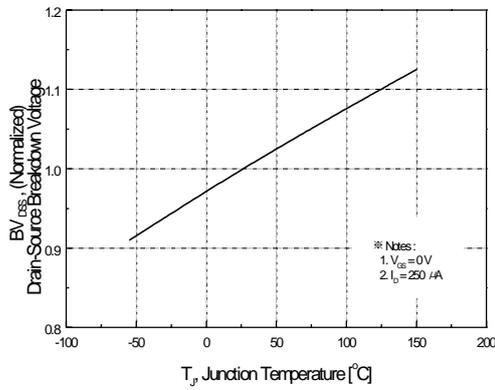


**Figure 5. Capacitance Characteristics**

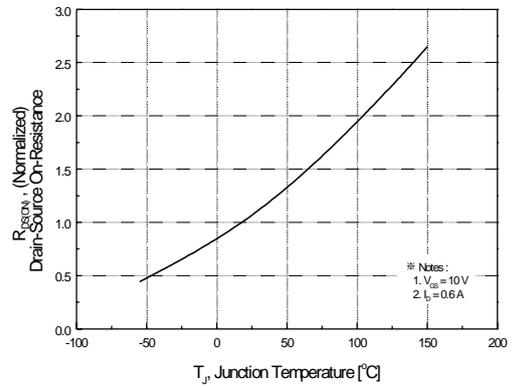


**Figure 6. Gate Charge Characteristics**

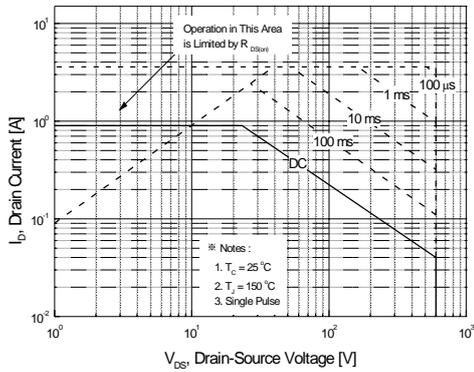
# Typical Characteristics (Continued)



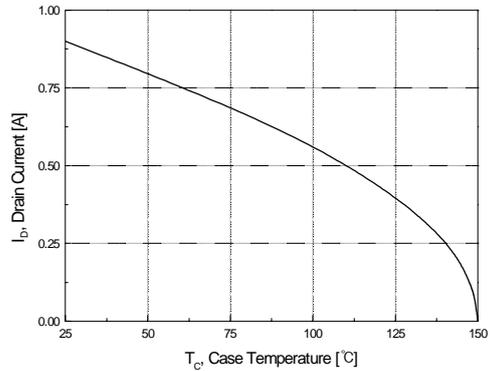
**Figure 7. Breakdown Voltage Variation vs. Temperature**



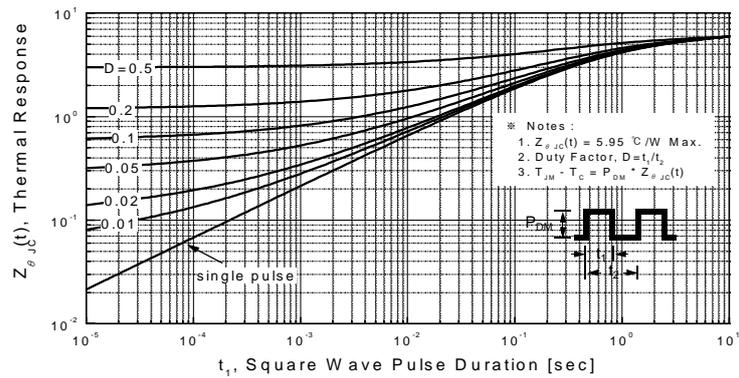
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**

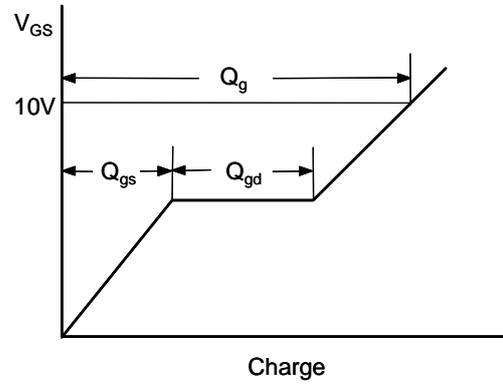
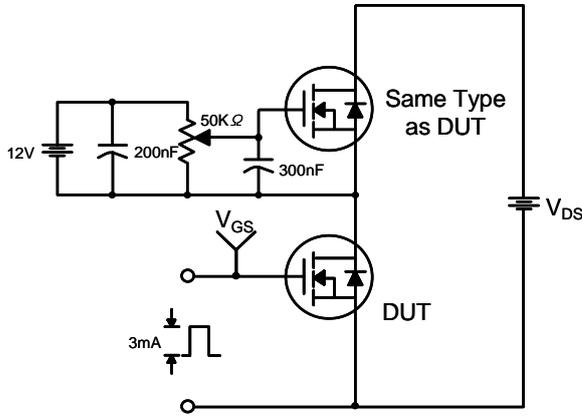


**Figure 10. Maximum Drain Current vs. Case Temperature**

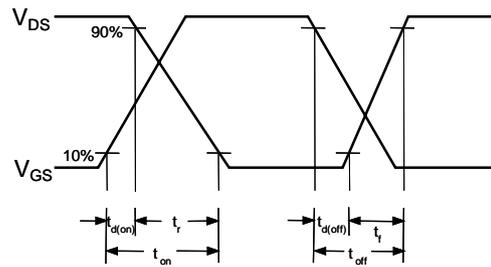
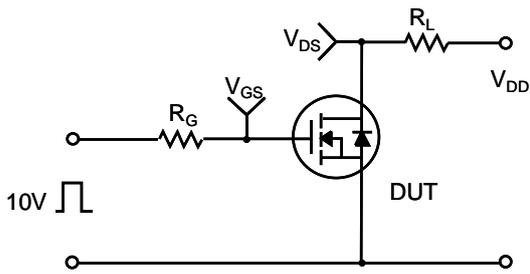


**Figure 11. Transient Thermal Response Curve**

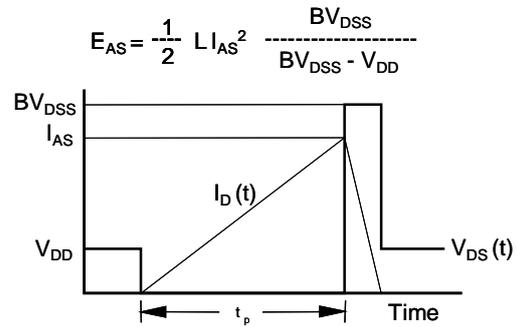
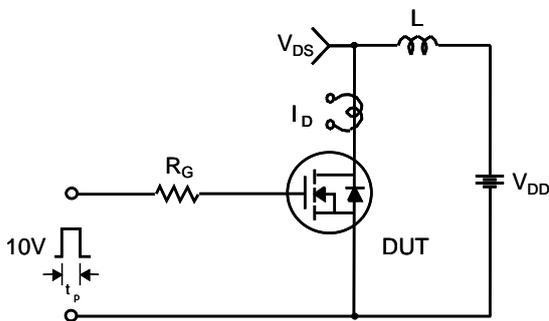
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**



Peak Diode Recovery dv/dt Test Circuit & Waveforms

