

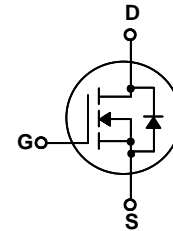
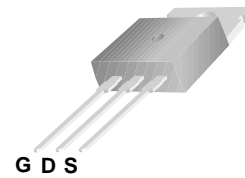


## WFP5N60

### 600V N-Channel MOSFET

#### Features

- Low Intrinsic Capacitances
- Excellent Switching Characteristics
- Extended Safe Operating Area
- Unrivalled Gate Charge : 15 nC (Typ.)
- BVDSS=600V, ID=4.5A
- Lower  $R_{DS(on)}$  : 2.5 $\Omega$  (Max) @VG=10V
- 100% Avalanche Tested



TO-220

G-Gate, D-Drain, S-Source

#### **Absolute Maximum Ratings** $T_c=25^\circ\text{C}$ unless other wise noted

Symbol	Parameter	WFP5N60	Units
$V_{DSS}$	Drain-Source Voltage	600	V
$I_D$	Drain Current -continuous ( $T_c=25^\circ\text{C}$ )	4.5	A
	-continuous ( $T_c=100^\circ\text{C}$ )	1.8	A
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Plused Avanche Energy (Note1)	240	mJ
$I_{AR}$	Avalanche Current (Note2)	4	A
$P_D$	Power Dissipation ( $T_c=25^\circ\text{C}$ )	100	W
$T_J, T_{STG}$	Operating and Storage Temperature Range	-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	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	--	1.04	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case to Sink	0.5	--	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	62.5	$^\circ\text{C}/\text{W}$

**Electrical Characteristics** Tc=25°C unless other wise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max	Units
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	ID=250 μ A, VGS=0	600	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	ID=250 μ A, Reference to 25°C	--	0.6	--	V/°C
IDSS	Zero Gate Voltage Drain Current	Vds=600V, Vgs=0V	--	--	10	μ A
		Vds=480V, Tc=125°C			100	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
<b>On Characteristics</b>						
VGS(th)	Gate Threshold Voltage	Id=250uA, Vds=Vgs	2	--	4	V
RDS(on)	Static Drain-Source On-Resistance	Id=2A, Vgs=10V	--	--	2.3	Ω
<b>Dynamic Characteristics</b>						
Ciss	Input Capacitance	VDS=25V, VGS=0, f=1.0MHz	--	560	730	pF
Coss	Output Capacitance		--	80	100	pF
Crss	Reverse Transfer Capacitance		--	9	12	pF
<b>Switching Characteristics</b>						
Td(on)	Turn-On Delay Time	VDD=300V, ID=4.5A RG=25 Ω (Note 3,4)	--	13	35	nS
Tr	Turn-On Rise Time		--	45	100	nS
Td(off)	Turn-Off Delay Time		--	35	80	nS
Tf	Turn-Off Fall Time		--	40	90	nS
Qg	Total Gate Charge	VDS=480, VGS=10V, ID=4.5A (Note 3,4)	--	16	20	nC
Qgs	Gate-Source Charge		--	3.5	--	nC
Qgd	Gate-Drain Charge			7.8	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
IS	Maximum Continuous Drain-Source Diode Forward Current		--	--	4.5	A
ISM	Maximum Pulsed Drain-Source Diode Forward Current		--	--	18	A
VSD	Drain-Source Diode Forward Voltage	Id=4.5A	--	--	1.5	V
trr	Reverse Recovery Time	IS=4.5A, VGS=0V	--	270	--	nS
Qrr	Reverse Recovery Charge	diF/dt=100A/ μ s (Note3)	--	1.8	--	μ C
*Notes	1, L=21.7mH, IAS=4.5A, VDD=50V, RG=25Ω, Starting TJ =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

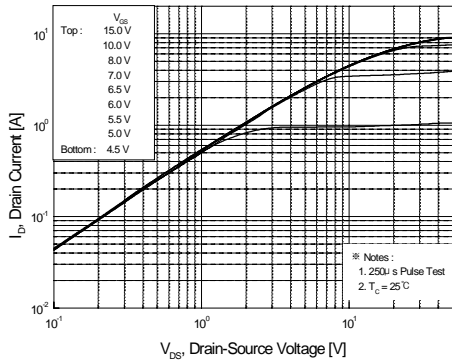


Figure 1. On-Region Characteristics

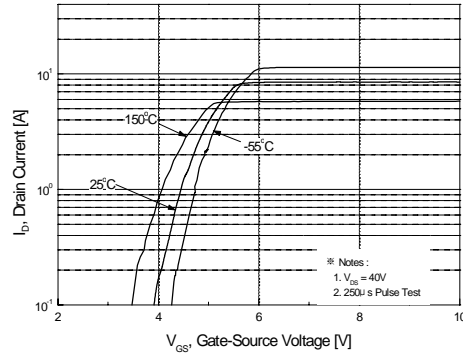


Figure 2. Transfer Characteristics

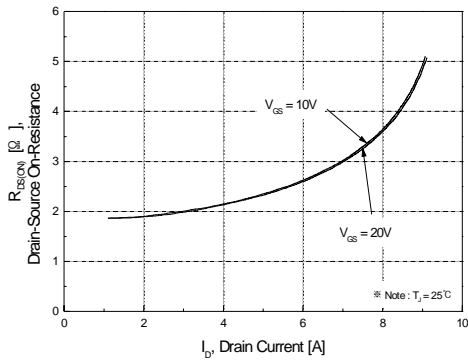


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

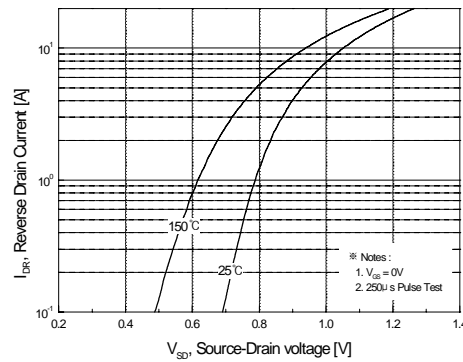


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

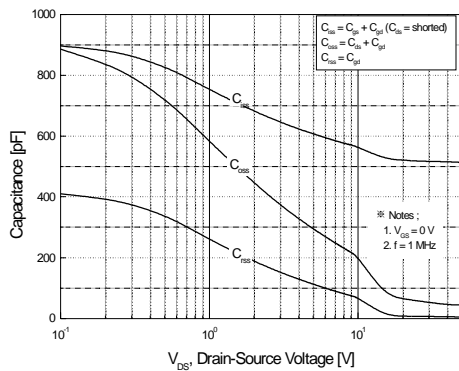


Figure 5. Capacitance Characteristics

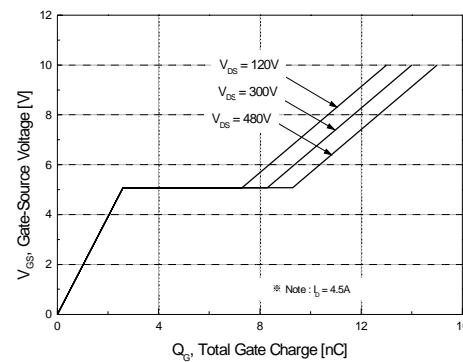
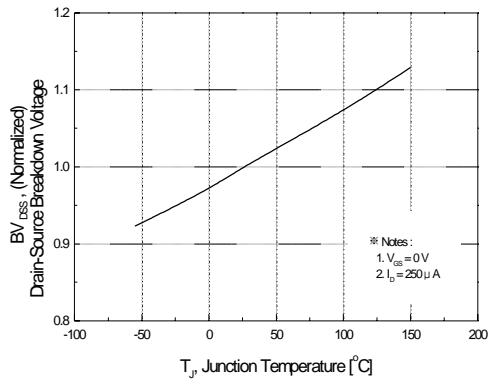
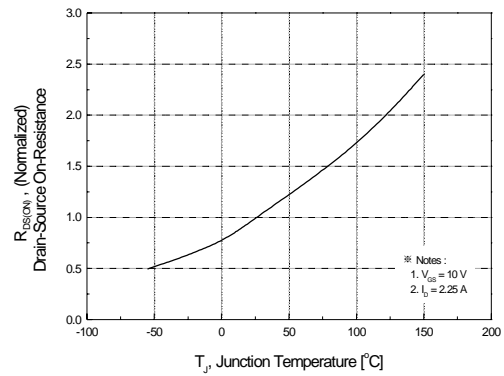


Figure 6. Gate Charge Characteristics

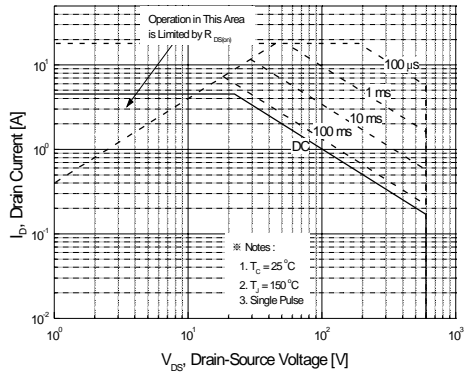
# Typical Characteristics (Continued)



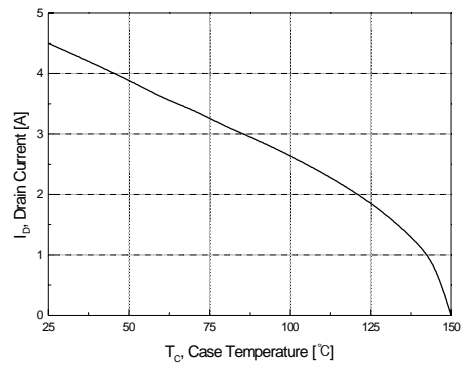
**Figure 7. Breakdown Voltage Variation vs Temperature**



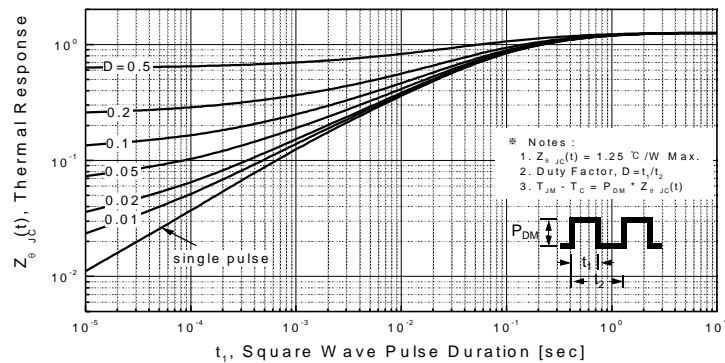
**Figure 8. On-Resistance Variation vs Temperature**



**Figure 9-1. Maximum Safe Operating Area for WFP5N60**

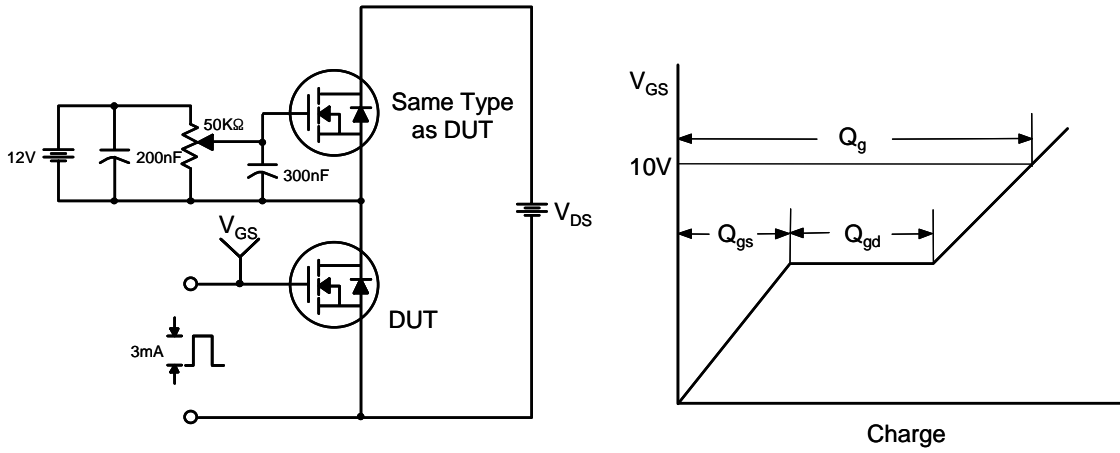


**Figure 10. Maximum Drain Current vs Case Temperature**

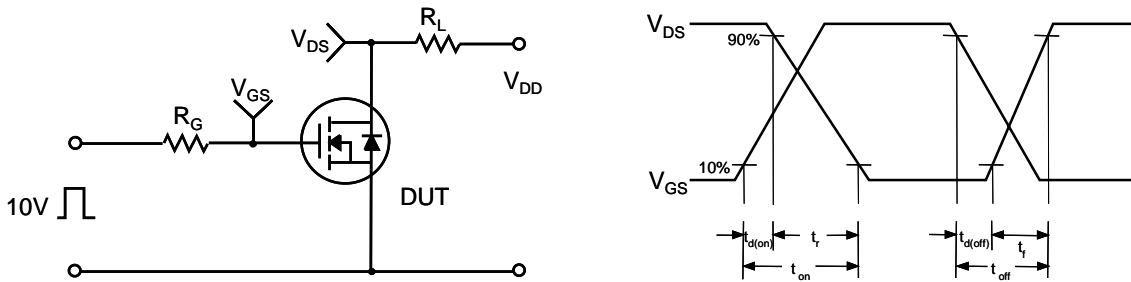


**Figure 11-1. Transient Thermal Response Curve for WFP5N60**

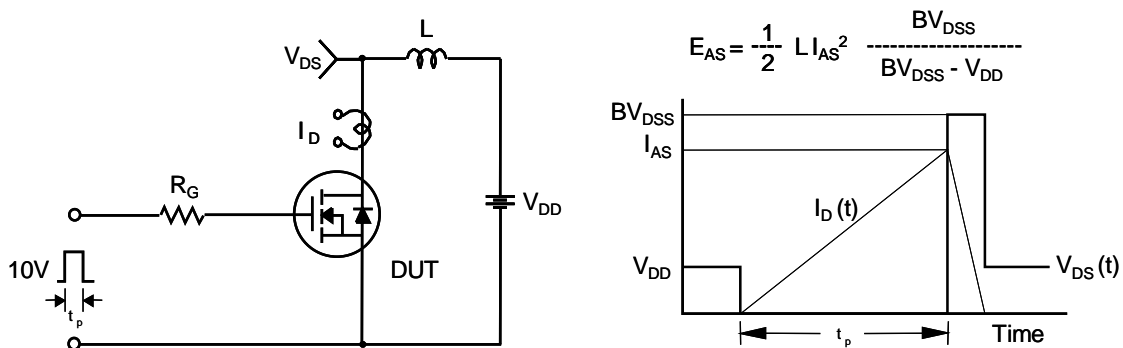
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**



Peak Diode Recovery dv/dt Test Circuit & Waveforms

