



WFU4N60/WFD4N60

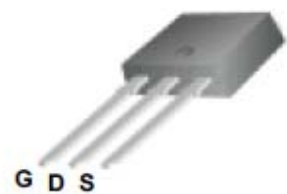
600V N-Channel MOSFET

Features

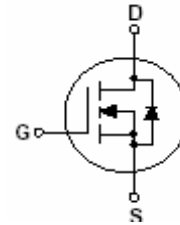
- Low Intrinsic Capacitances
- Excellent Switching Characteristics
- Extended Safe Operating Area
- Unrivalled Gate Charge : 15 nC (Typ.)
- BVDSS=600V, ID=4A
- Lower $R_{DS(on)}$: 2.5Ω (Max) @VG=10V
- 100% Avalanche Tested



TO-252



TO-251



G-Gate, D-Drain, S-Source

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

Symbol	Parameter	WFU/D4N60	Units
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current -continuous ($T_c=25^\circ\text{C}$)	4	A
	-continuous ($T_c=100^\circ\text{C}$)	1.8	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Plused Avanche Energy (Note1)	240	mJ
I_{AR}	Avalanche Current (Note2)	4	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	44	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	--	2.56	$^\circ\text{C}/\text{W}$
$R_{\theta CA}$	Thermal Resistance, Junction to Ambient*	--	50	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	110	$^\circ\text{C}/\text{W}$

*When mounted on the minimum pad size recommended (PCB mounted)

Electrical Characteristics $T_c=25^\circ\text{C}$ unless other wise noted						
Symbol	Parameter	Test Condition	Min.	Typ.	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\ \mu\text{A}, V_{GS}=0$	600	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D=250\ \mu\text{A}$, Reference to 25°C	--	0.6	--	$V/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{ds}=500\text{V}, V_{gs}=0\text{V}$	--	--	1	μA
		$V_{ds}=480\text{V}, T_c=125^\circ\text{C}$			10	μA
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
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$I_D=250\ \mu\text{A}, V_{ds}=V_{gs}$	2	--	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=2.0\text{A}, V_{gs}=10\text{V}$	--	--	2.5	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=25\text{V}, V_{GS}=0,$ $f=1.0\text{MHz}$	--	515	670	pF
C_{oss}	Output Capacitance		--	55	72	pF
C_{rss}	Reverse Transfer Capacitance		--	6.5	8.5	pF
Switching Characteristics						
$T_d(on)$	Turn-On Delay Time	$V_{DD}=300\text{V}, I_D=4\text{A},$ $R_G=25\ \Omega$ (Note 3,4)	--	150	30	nS
T_r	Turn-On Rise Time		--	42	90	nS
$T_d(off)$	Turn-Off Delay Time		--	38	85	nS
T_f	Turn-Off Fall Time		--	46	100	nS
Q_g	Total Gate Charge	$V_{DS}=480, V_{GS}=10\text{V},$ $I_D=4\text{A}$ (Note 3,4)	--	15	19	nC
Q_{gs}	Gate-Source Charge		--	2.	--	nC
Q_{gd}	Gate-Drain Charge			6.6	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	16	A
V_{SD}	Drain-Source Diode Forward Voltage	$I_D=4\text{A}$	--	--	1.25	V
t_{rr}	Reverse Recovery Time	$I_S=4\text{A}, V_{GS}=0\text{V}$	--	300	--	nS
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100\text{A}/\mu\text{s}$ (Note3)	--	2.2	--	μC
*Notes	1, $L=27.5\text{mH}, I_{AS}=4\text{A}, V_{DD}=50\text{V}, R_G=25\ \Omega$, 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

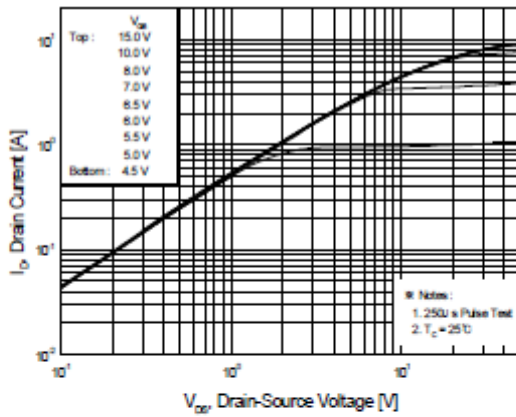


Figure 1. On-Region Characteristics

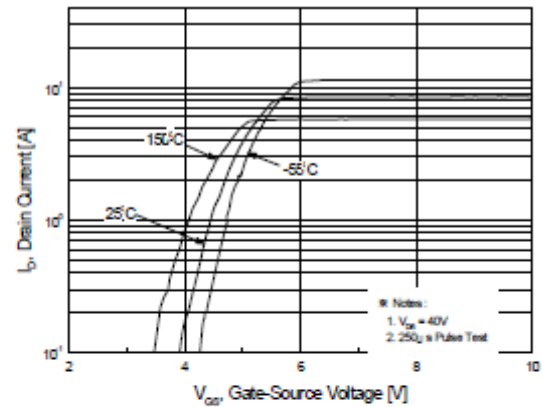


Figure 2. Transfer Characteristics

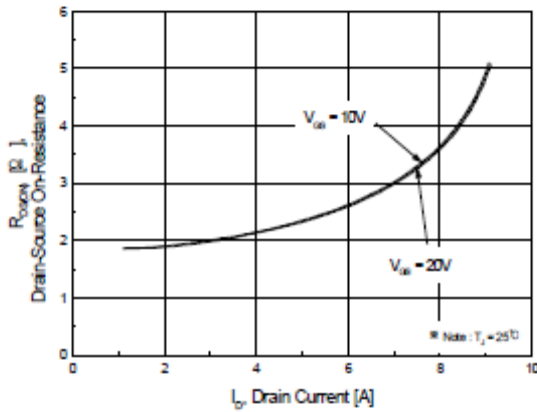


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

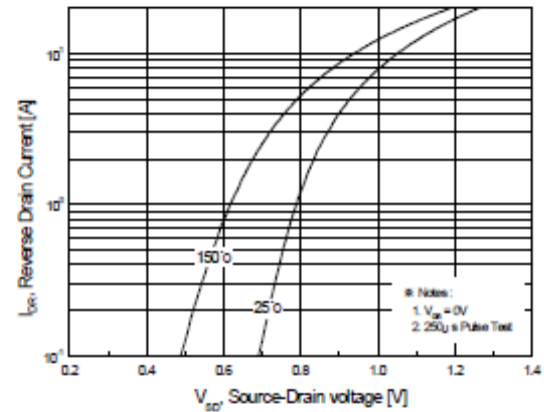


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

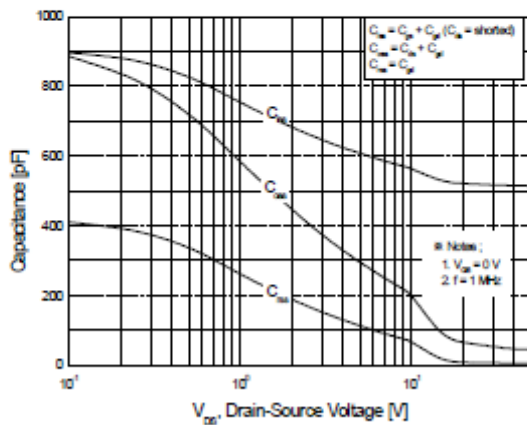


Figure 5. Capacitance Characteristics

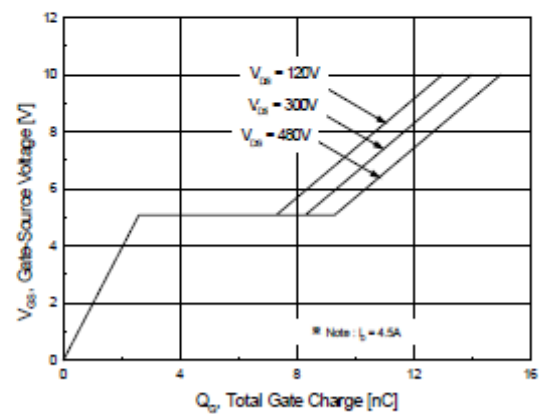


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

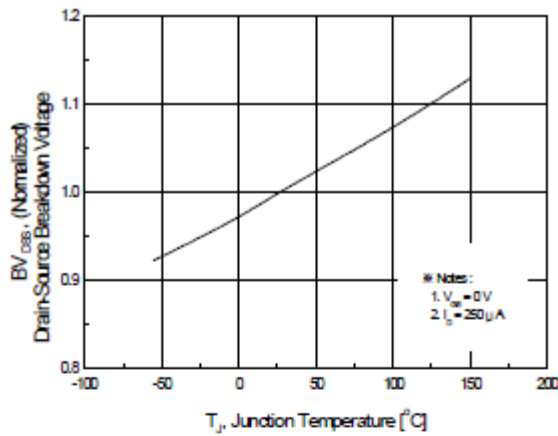


Figure 7. Breakdown Voltage Variation vs Temperature

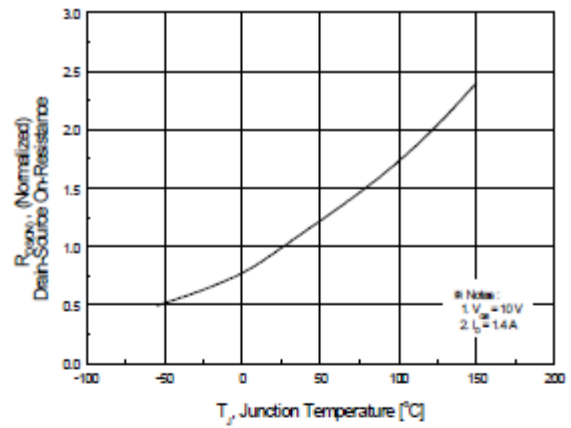


Figure 8. On-Resistance Variation vs Temperature

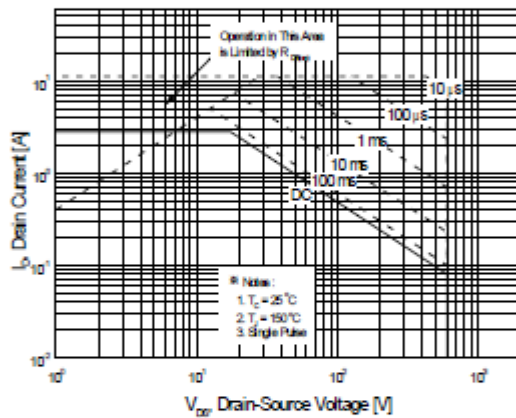


Figure 9. Maximum Safe Operating Area

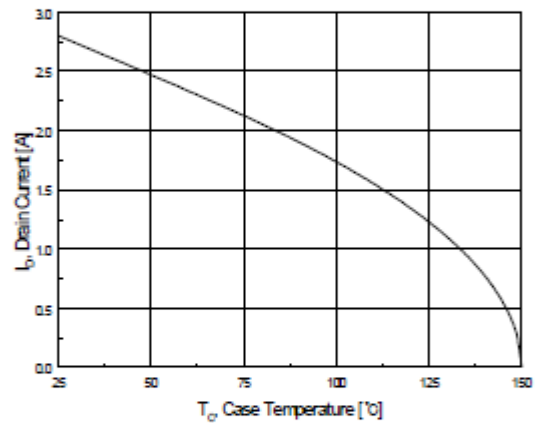


Figure 10. Maximum Drain Current vs Case Temperature

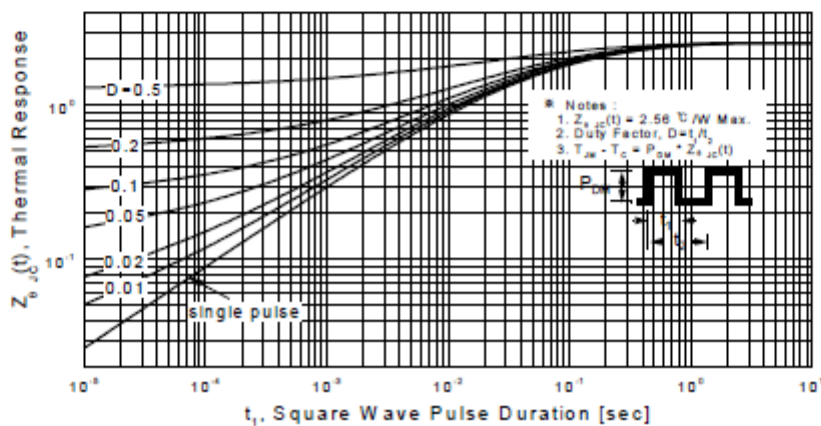
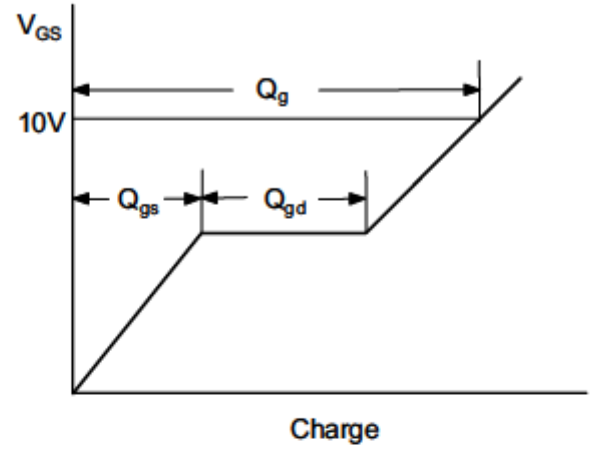
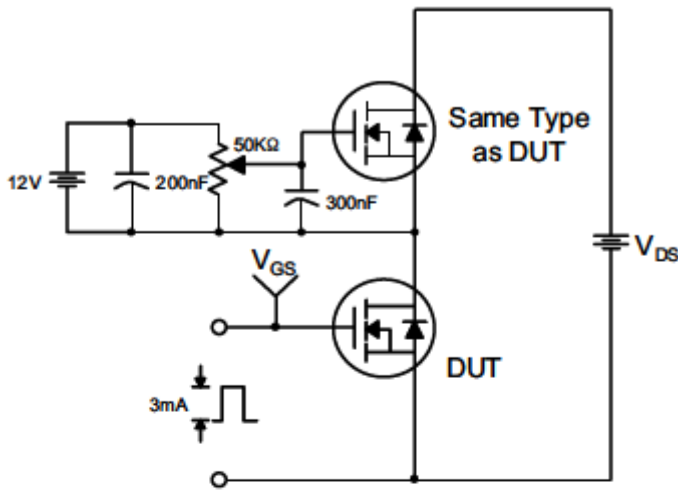
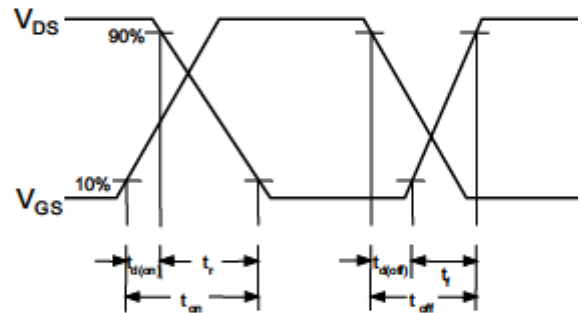
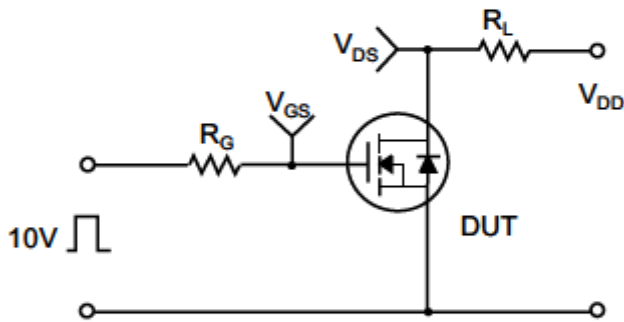


Figure 11. Transient Thermal Response Curve

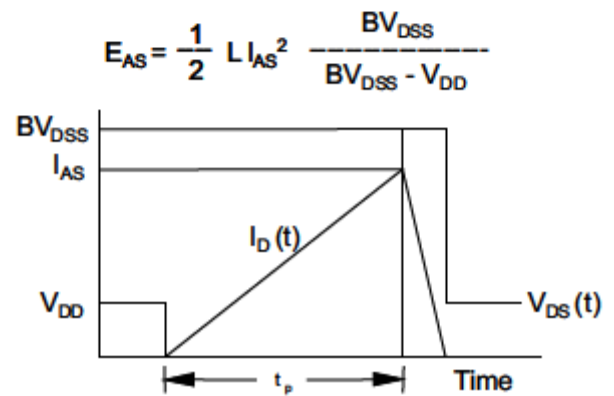
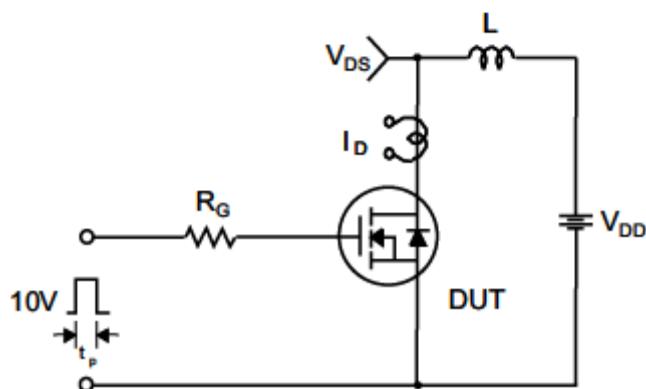
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

