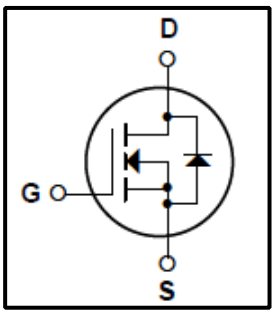
WFF12N60

Silicon N-Channel MOSFET

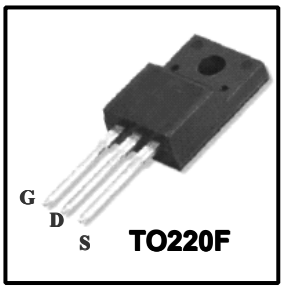
Features

- 12A, 600V,$R_{DS(on)}$(Max 0.65Ω)@V_{GS}=10V
- Ultra-low Gate Charge(Typical 39nC)
- Fast Switching Capability
- 100%Avalanche Tested
- Isolation Voltage (V_{ISO} = 4000V AC)
- Maximum Junction Temperature Range(150℃)



General Description

This Power MOSFET is produced using Winsemi's advanced planar stripe, VDMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. This devices is specially well suited for high efficiency switch model power supplies, power factor correction and half bridge and full bridge resonant topology line a Electronic lamp ballast.



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain Source Voltage	600	V
I_D	Continuous Drain Current(@Tc=25℃)	12*	A
	Continuous Drain Current(@Tc=100℃)	7.6*	A
I_{DM}	Drain Current Pulsed (Note1)	48*	A
V_{GS}	Gate to Source Voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	880	mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	25	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Total Power Dissipation(@Tc=25℃)	51	W
	Derating Factor above 25℃	0.41	W/℃
T_J, T_{stg}	Junction and Storage Temperature	-55~150	℃
T_L	Maximum lead Temperature for soldering purposes	300	℃

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJC}	Thermal Resistance, Junction-to-Case	-	-	2.45	℃/W
R_{QCS}	Thermal Resistance, Case to Sink	-	0.5	-	℃/W
R_{QJA}	Thermal Resistance, Junction-to-Ambient	-	-	62.5	℃/W

Electrical Characteristics (Tc = 25°C)

Characteristics		Symbol	Test Condition	Min	Type	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±30 V, VDS = 0 V	-	-	±100	nA
Gate−source breakdown voltage		$V_{(BR)GSS}$	I_G = ±10 μA, VDS = 0 V	±30	-	-	V
Drain cut−off current		I_{DSS}	V_{DS} = 600 V, VGS = 0 V	-	-	1	μA
Drain−source breakdown voltage		$V_{(BR)DSS}$	I_D = 250 μA, VGS = 0 V	600	-	-	V
Break Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA, Referenced to 25℃	-	0.5	-	V/℃
Gate threshold voltage		$V_{GS(th)}$	V_{DS} = 10 V, ID =250 μA	3	-	4.5	V
Drain−source ON resistance		$R_{DS(ON)}$	V_{GS} = 10 V, ID =6.0A	-	-	0.65	Ω
Forward Transconductance		gfs	V_{DS} = 50 V, ID =6.0A	-	15		S
Input capacitance		C_{iss}	V_{DS} = 25 V,	-	1790	2355	pF
Reverse transfer capacitance		C_{rss}	V_{GS} = 0 V,	-	175	232	
Output capacitance		C_{oss}	f = 1 MHz	-	23	31	
Switching time	Turn−on Rise time	t_r	V_{DD} =300 V,	-	133	175	ns
	Turn−on Delay time	t_{on}	I_D =12 A	-	80	100	
	Turn−off Fall time	t_f	R_G=9.1 Ω	-	100	160	
	Turn−off Delay time	t_{off}	R_D=31 Ω (Note4,5)	-	233	310	
Total gate charge (gate−source plus gate−drain)		Qg	V_{DD} = 400 V,	-	39	52	nC
Gate−source charge		Qgs	V_{GS} = 10 V,	-	8.5	-	
Gate−drain (“miller”) Charge		Qgd	I_D =1 A (Note4,5)	-	19	-	

Source−Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I_{DR}	-	-	-	12	A
Pulse drain reverse current	I_{DRP}	-	-	-	48	A
Forward voltage (diode)	V_{DSF}	I_{DR} = 12 A, VGS = 0 V	-	-	1.4	V
Reverse recovery time	t_{rr}	I_{DR} = 12 A, VGS = 0 V,	-	418	-	ns
Reverse recovery charge	Q_{rr}	dI_{DR} / dt = 100 A / μs	-	4.85	-	μC

Note 1.Repeativity rating :pulse width limited by junction temperature

2.L=11.2mH,I_{AS}=12A,V_{DD}=50V,R_G=25Ω,Starting T_J=25℃

3.I_{SD}≤12A,di/dt≤300A/us, V_{DD}<BV_{DSS},STARTING TJ=25℃

4.Pulse Test: Pulse Width≤300us,Duty Cycle≤2%

5.Essentially independent of operating temperature.

This transistor is an electrostatic sensitive device

Please handle with caution

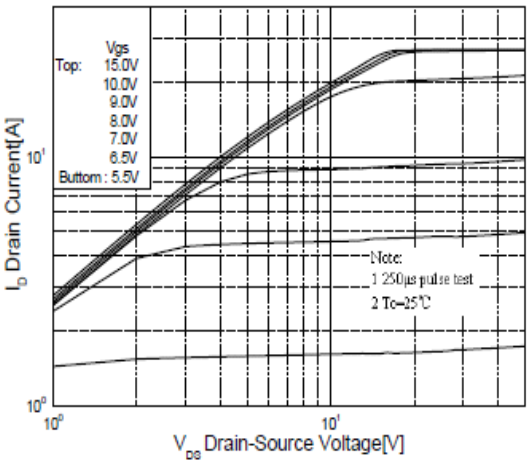


Fig. 1 On-State Characteristics

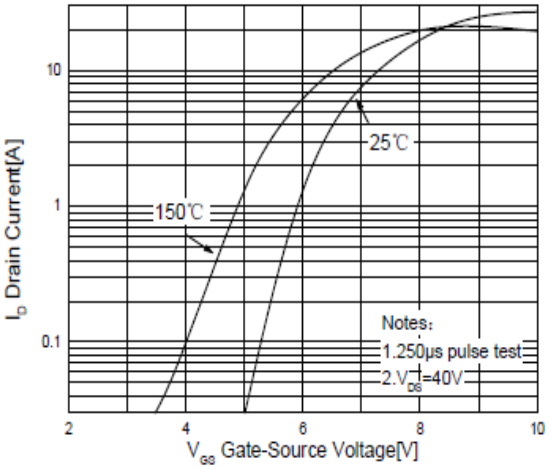


Fig.2 Transfer Characteristics

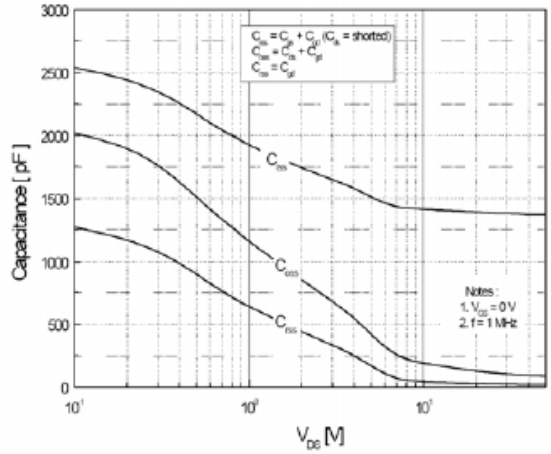


Fig.3 Capacitance Variation vs Drain Voltage

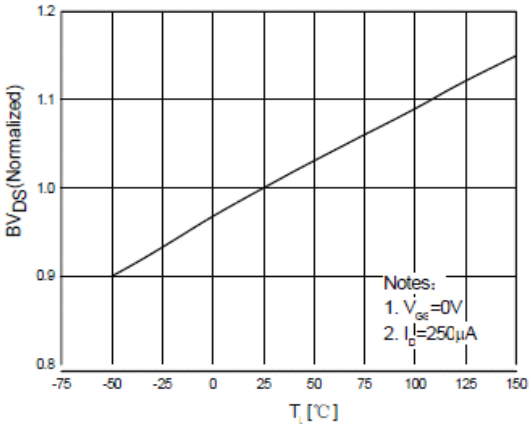


Fig.4 Breakdown Voltage Variation vs Temperature

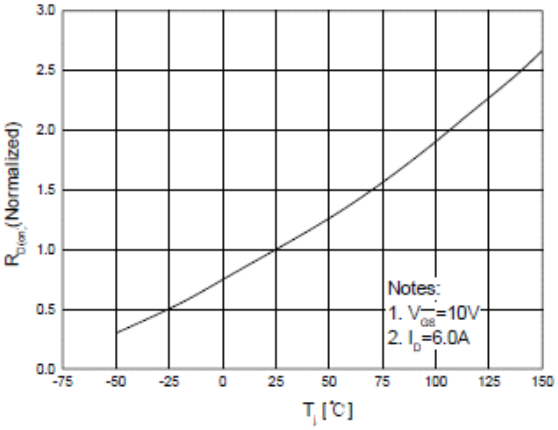


Fig.5 On-Resistance Variation vs Junction Temperature

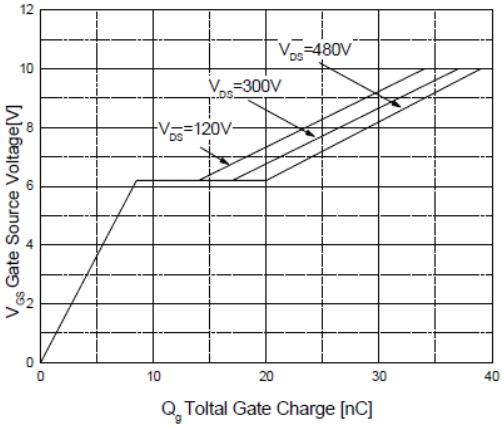


Fig.6 Gate Charge Characteristics

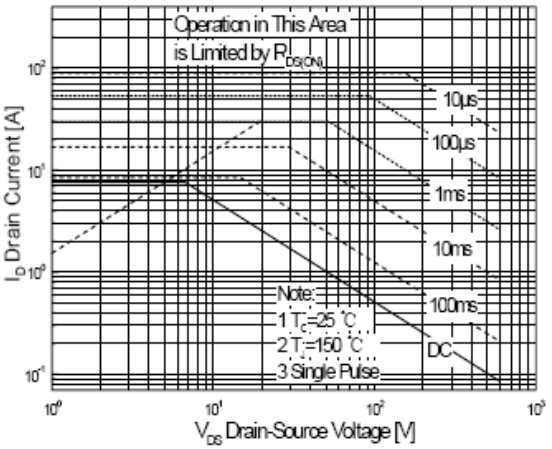


Fig.7 Maximum Safe Operation Area

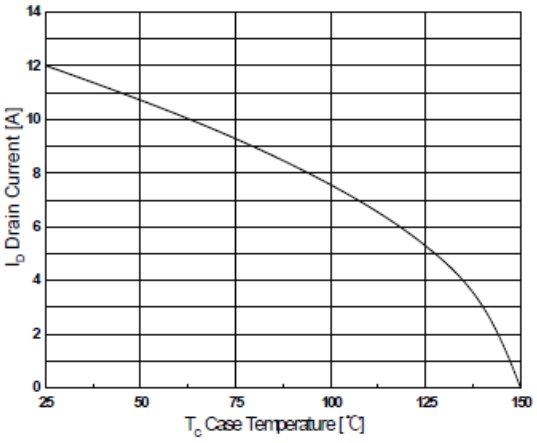


Fig.8 Maximum Drain Current vs Case Temperature

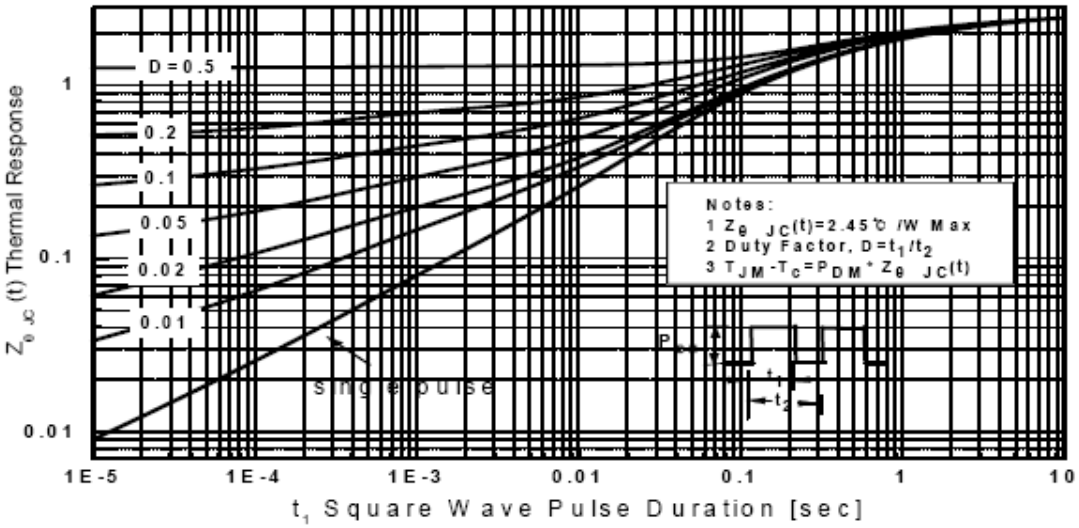
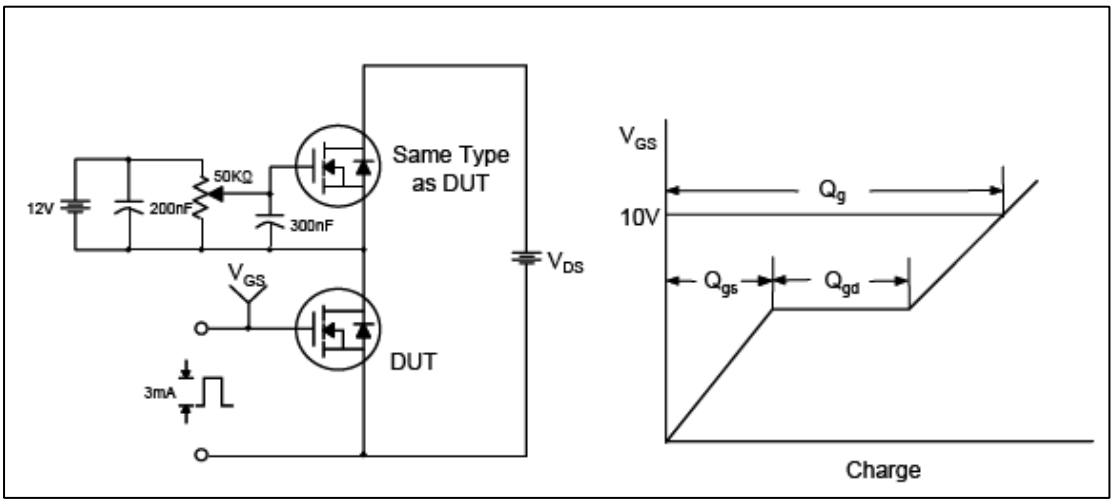


Fig.9 Transient Thermal Response Curve



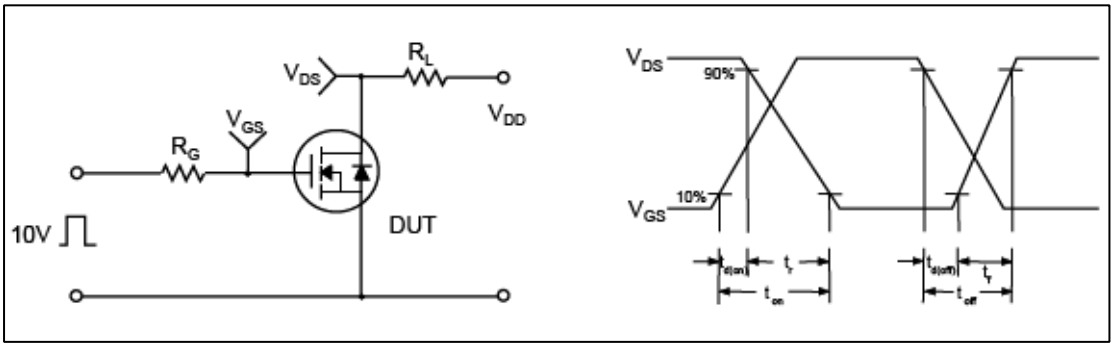


Fig.11 Resistive Switching Test Circuit & Waveform

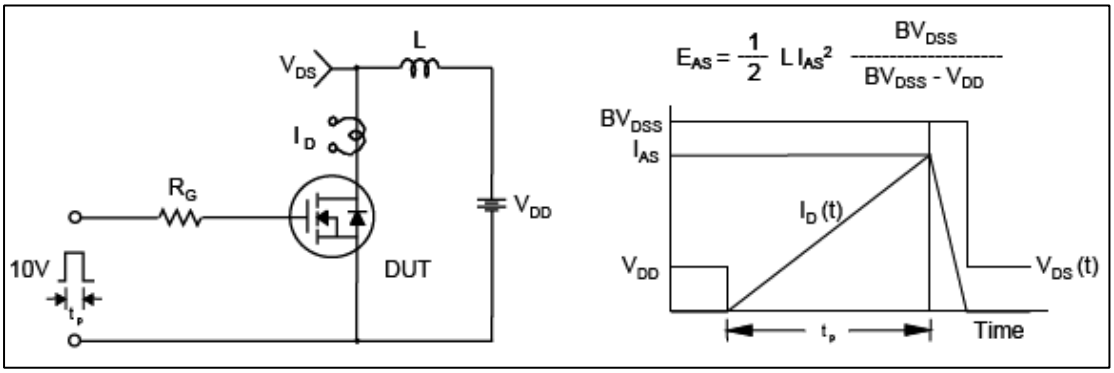


Fig.12 Unclamped Inductive Switching Test Circuit & Waveform

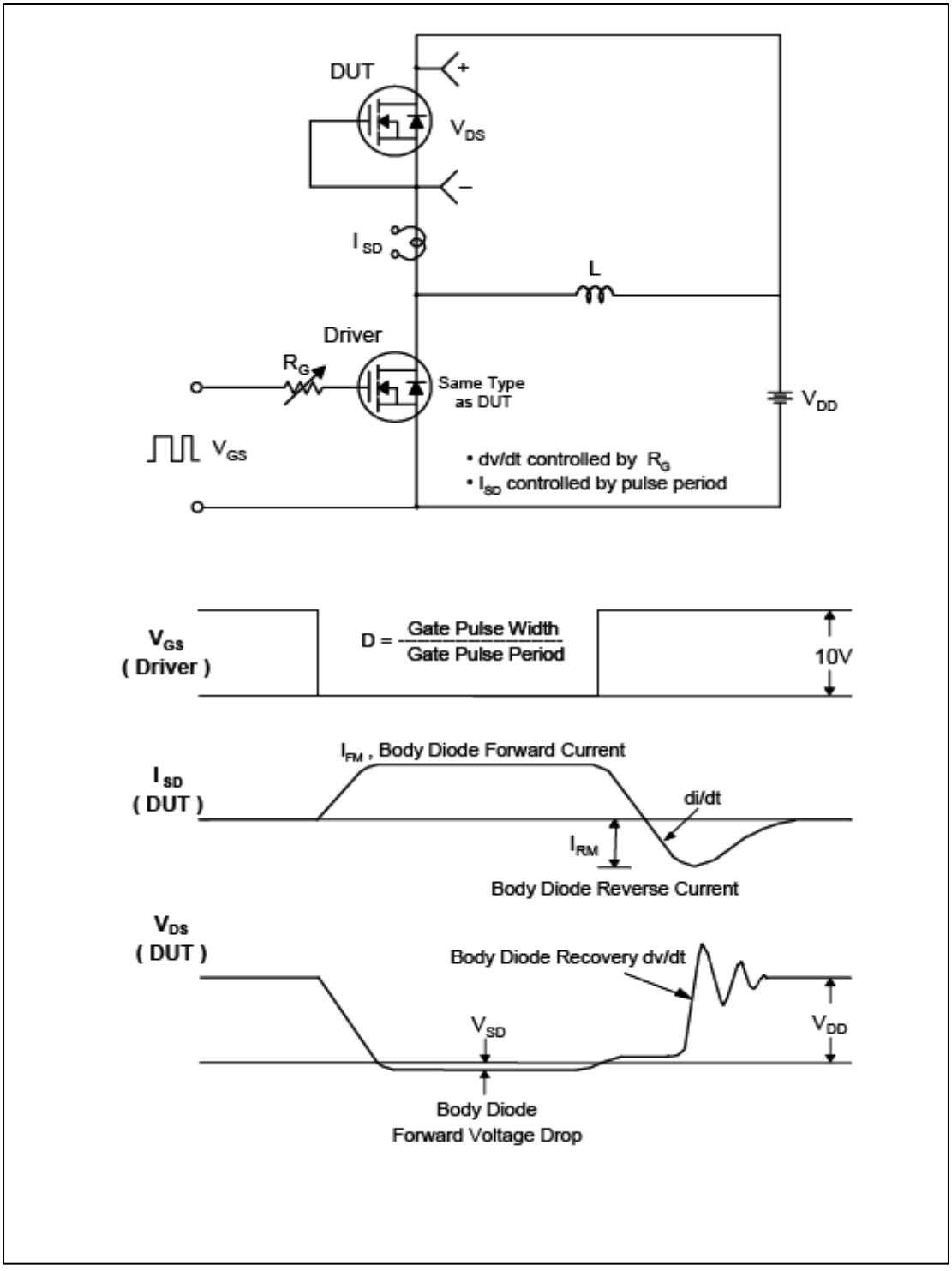


Fig.13 Peak Diode Recovery dv/dt Test Circuit & Waveform

TO-220F Package Dimension

Unit: mm