## *Silicon N-Channel MOSFET*

## Features

- 4A,600V,$R_{DS(on)}$(Max 2.2Ω)@V_{GS}=10V

- Ultra-low Gate Charge(Typical 16nC)

- Fast Switching Capability

- 100%Avalanche Tested

- Isolation Voltage(V_{ISO}=4000V AC)

- Maximum Junction Temperature Range(150℃)
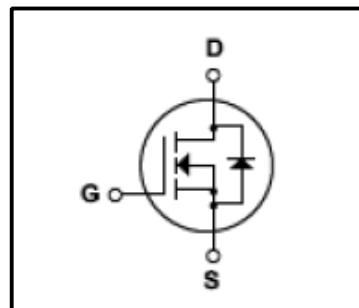
General Description

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 half   bridge and full   bridge resonant topology   line a electronic lamp ballast.

TO 220F
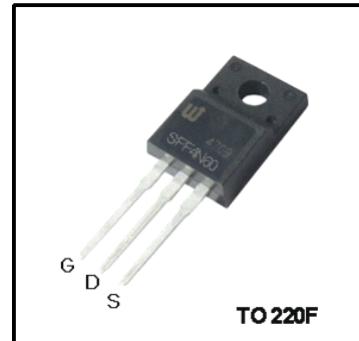
Absolute Maximum Ratings

Symbol	Parameter		Value	Units
V_{DSS}	Drain Source Voltage		600	V
I_D	Continuous Drain Current(@Tc=25℃)		4*	A
	Continuous Drain Current(@Tc=100℃)		2.5*	A
I_{DM}	Drain Current Pulsed	(Note1)	16*	A
V_{GS}	Gate to Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note2)	240	mJ
E_{AR}	Repetitive Avalanche Energy	(Note1)	10	mJ
dv/dt	Peak Diode Recovery dv /dt	(Note3)	4.5	V/ ns
P_D	Total Power Dissipation(@Tc=25℃)		33	W
	Derating Factor above 25℃		0.26	W/℃
T_J,T_{stg}	Junction and Storage Temperature		-55~150	℃
T_L	Channel Temperature		300	℃

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJC}	Thermal Resistance , Junction -to -Case	-	-	3.79	℃/W
R_{QJA}	Thermal Resistance , Junction-to -Ambient	-	-	62.5	℃/W

Electrical Characteristics(Tc=25℃)

Characteristics		Symbol	Test Condition	Min	Type	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS}=\pm30V, V_{DS}=0V$	-	-	±100	nA
Gate-source breakdown voltage		$V_{(BR)GSS}$	$I_G=\pm10\ \mu A, V_{DS}=0V$	±30	-	-	V
Drain cut -off current		I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	-	10	μA
			$V_{DS}=480V, Tc=125℃$	-		100	μA
Drain -source breakdown voltage		$V_{(BR)DSS}$	$I_D=250\ \mu A, V_{GS}=0V$	600	-	-	V
Gate threshold voltage		$V_{GS(th)}$	$V_{DS}=10V, I_D=250\ \mu A$	2	-	4	V
Drain -source ON resistance		$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.25A$	-	1.8	2.2	Ω
Input capacitance		C_{iss}	$V_{DS}=25V,$	-	545	670	pF
Reverse transfer capacitance		C_{rss}	$V_{GS}=0V,$	-	7	10	
Output capacitance		C_{oss}	f=1MHz	-	70	90	
Switching time	Rise time	tr	$V_{DD}=300V,$	-	10	30	ns
	Turn-on time	ton	$I_D=4.4A$,	-	35	80	
	Fall time	tf	$R_G=25\Omega,$	-	45	100	
	Turn-off time	toff	(Note4,5)	-	20	50	
Total gate charge(gate-source plus gate-drain)		Qg	$V_{DD}=480V,$ $V_{GS}=10V,$	-	16	20	nC
Gate-source charge		Qgs	$I_D=4.4A$	-	3.4	-	
Gate-drain("miller") Charge		Qgd	(Note4,5)	-	7	-	

Source-Drain Ratings and Characteristics(Ta=25℃)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I_{DR}	-	-	-	4	A
Pulse drain reverse current	I_{DRP}	-	-	-	17.6	A
Forward voltage(diode)	V_{DSF}	$I_{DR}=4.4A, V_{GS}=0V$	-	-	1.4	V
Reverse recovery time	trr	$I_{DR}=4.4A, V_{GS}=0V,$	-	390	-	ns
Reverse recovery charge	Qrr	$dI_{DR}\ /\ dt = 100\ A\ /\ \mu s$	-	2.2	-	μC

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

2.L=18.5mH $I_{AS}=4.4A, V_{DD}=50V, R_G=0\Omega$,Starting $T_J=25℃$

3.$I_{SD}≤4A, di/dt≤200A/us, V_{DD}<BV_{DSS}$, STARTING $T_J=25℃$

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

Steady, keep you advance
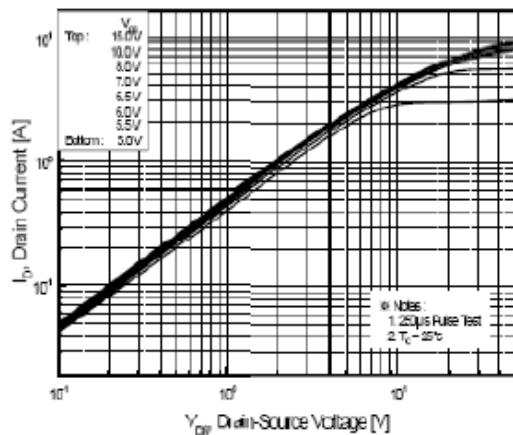
**Fig.1 On-State Characteristics**
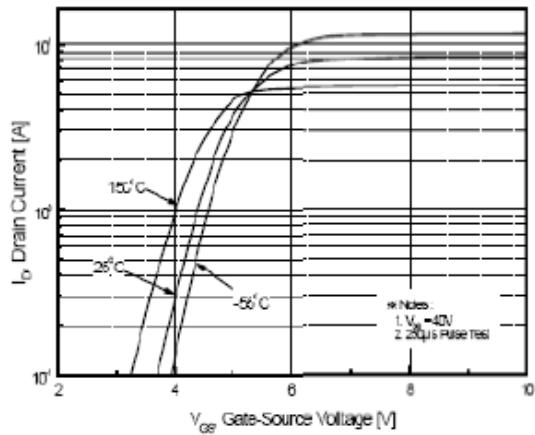
**Fig.2 Transfer Current characteristics**
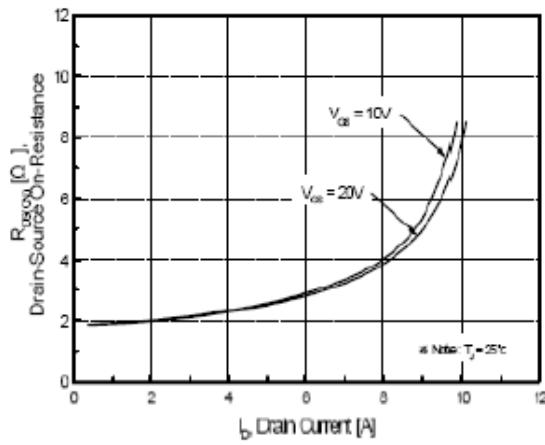
**Fig.3 On Resistance variation vs Drain Current**
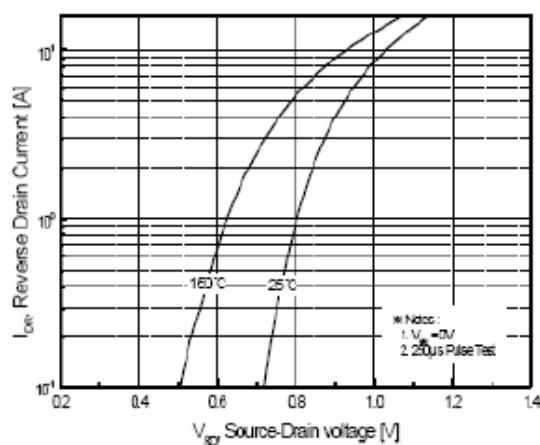
**Fig.4 Body Diode Forward Voltage Variation vs Source Current and temperature**
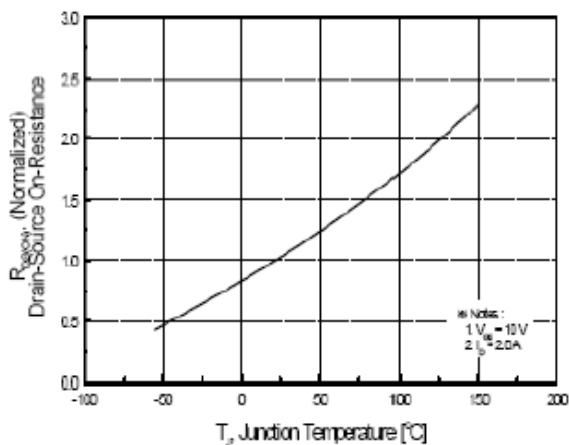

Fig.5 On-Resistance Variation vs Junction Temperature
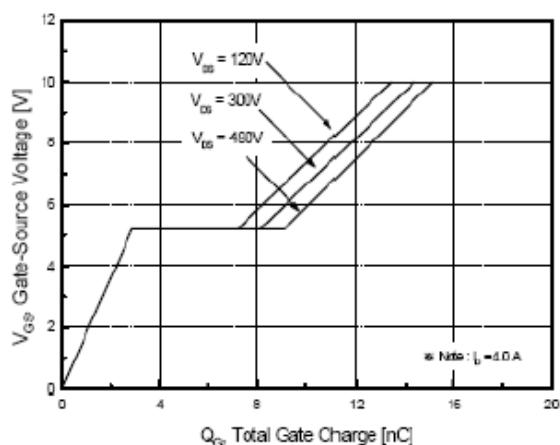

Fig.6 Gate Charge Characteristics

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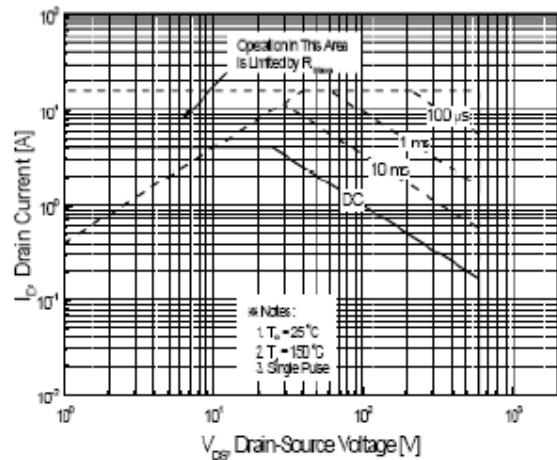
Fig.7 Maximum Safe Operation Area
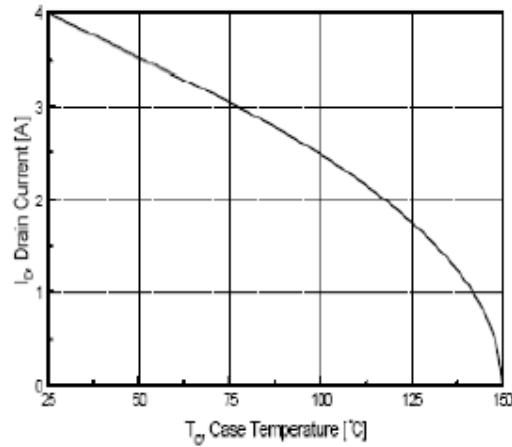
Fig.8 Maximum Drain Current vs Case Temperature
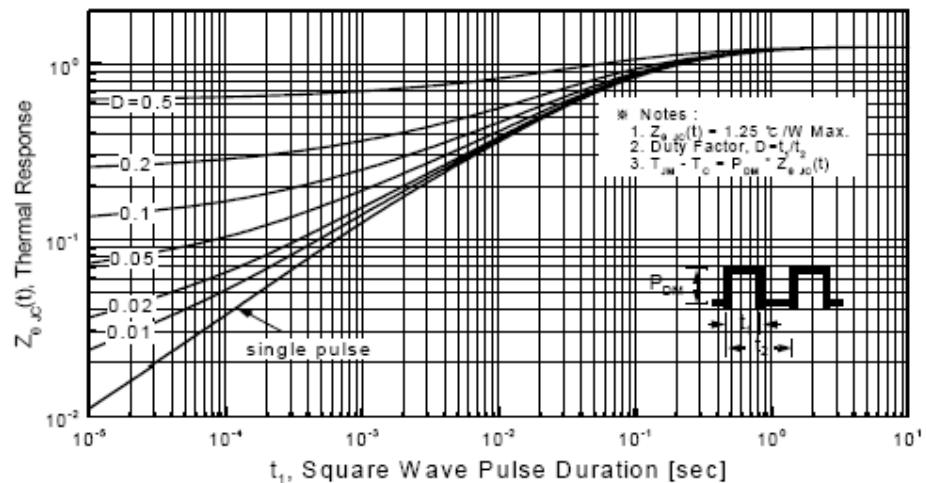
Fig.9 Transient Thermal Response curve

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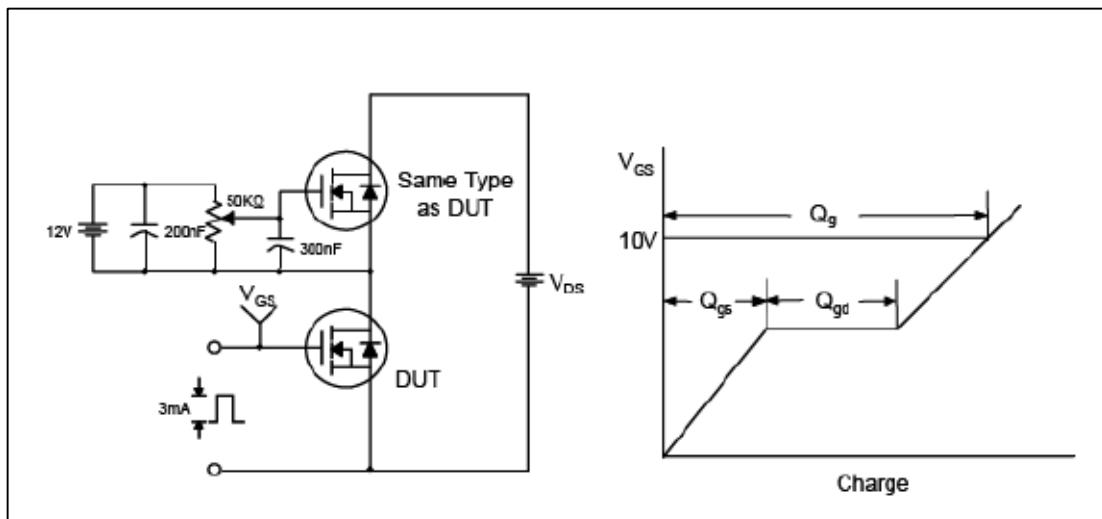
Fig.10 Gate Test circuit & Waveform
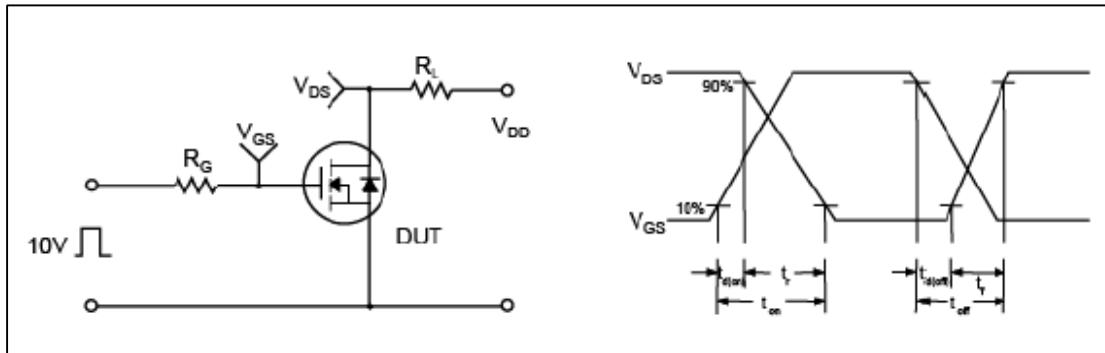
Fig.11 Resistive Switching Test Circuit & Waveform

$$E_{AS} = \frac{1}{2} L I_{AS}^2 \, \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$
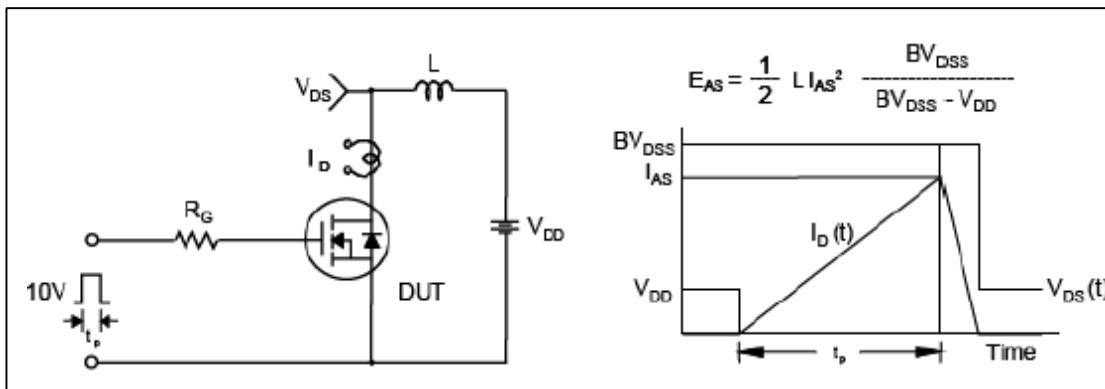
Fig.12 Uncamped Inductive Switching Test Circuit & Waveform

Steady, keep you advance
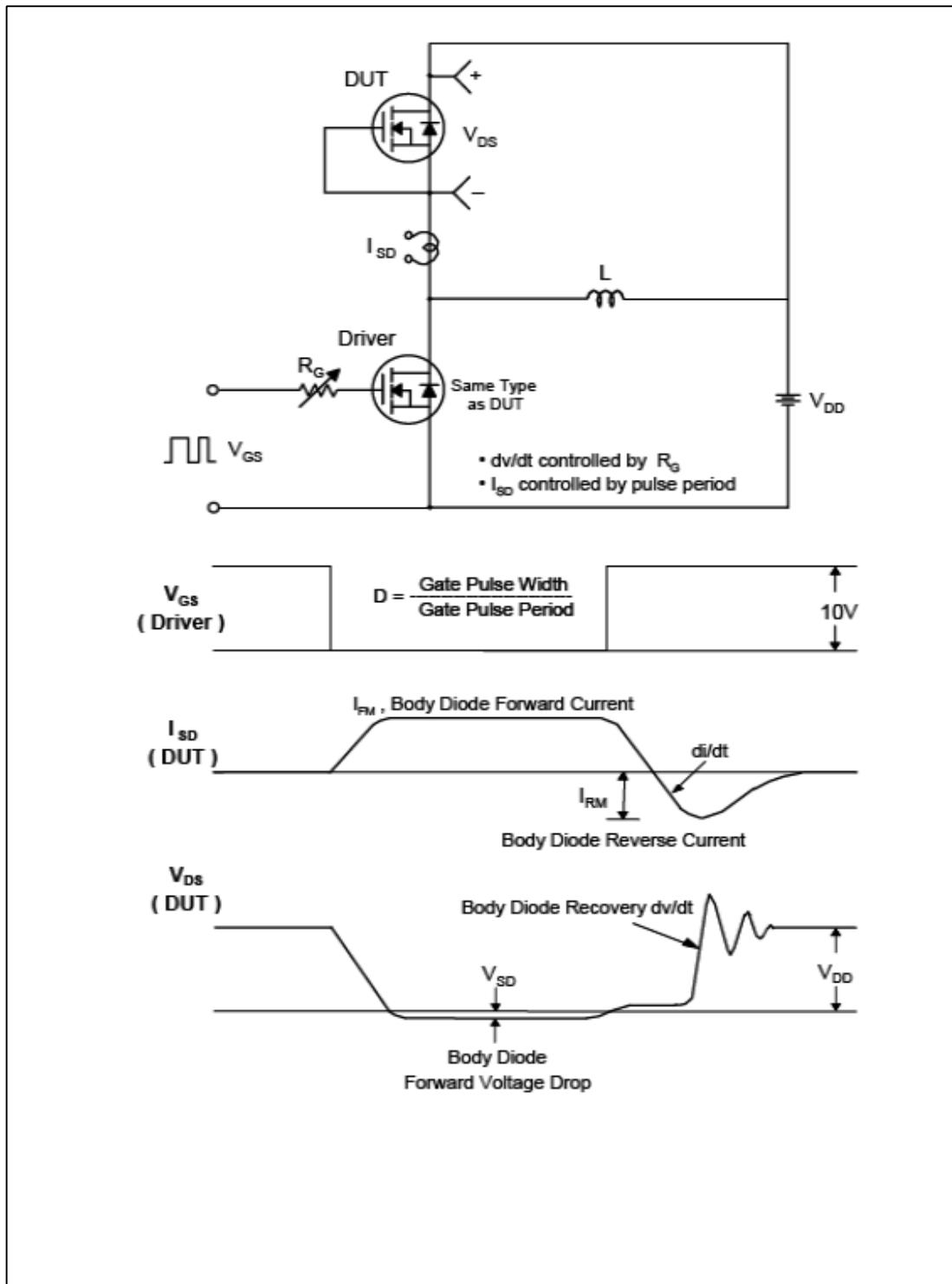
Fig.13 Peak Diode Recovery dv/dt Test Circuit & Waveform

TO-220F   Package Dimension

Unit:mm

10.16 ±0.20

(7.00)

ø3.18 ±0.10

3.30 ±0.10

15.80 ±0.20

MAX1.47

9.75 ±0.30

0.80 ±0.10

(30°)

0.35 ±0.10   #1

2.54TYP
[2.54 ±0.20]

2.54TYP
[2.54 ±0.20]

9.40 ±0.20

4.70 ±0.20

2.54 ±0.20

(0.70)

6.68 ±0.20

15.87 ±0.20

(1.00x45°)

0.50 +0.10 −0.05

2.76 ±0.20

Steady, keep you advance