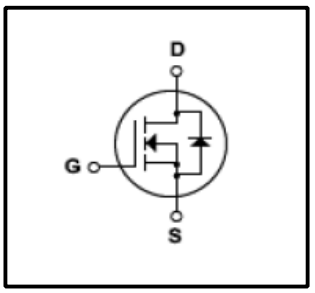
WFW24N50N

Silicon N-Channel MOSFET

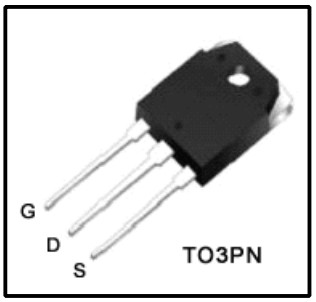
Features

- 24A,500V,$R_{DS(on)}$(Max0.19Ω)@V_{GS}=10V
- Ultra-low Gate charge(Typical 90nC)
- Fast Switching Capability
- 100%Avalanche Tested
- Maximum Junction Temperature Range(150℃)



General Description

This N-Channel enhancement mode power field effect transistors are produced using Winsemi's proprietary, planar stripe ,DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance , provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supplies.



Absolute Maximum Ratings

Symbol	Parameter		Value	Units
V_{DSS}	Drain Source Voltage		500	V
I_D	Continuous Drain Current(@Tc=25℃)		24	A
	Continuous Drain Current(@Tc=100℃)		15.2	A
I_{DM}	Drain Current Pulsed	(Note1)	96	A
V_{GS}	Gate to Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note2)	1100	mJ
E_{AR}	Repetitive Avalanche Energy	(Note1)	29	mJ
dv/dt	Peak Diode Recovery dv /dt	(Note3)	4.5	V/ ns
P_D	Total Power Dissipation(@Tc=25℃)		290	W
	Derating Factor above 25℃		2.33	W/℃
T_J,T_{stg}	Junction and Storage Temperature		-55~150	℃
T_L	Channel Temperature		300	℃

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJC}	Thermal Resistance , Junction -to -Case	-	-	0.43	℃/W
R_{QCS}	Thermal Resistance , Case-to-Sink	-	0.24	-	℃/W
R_{QJA}	Thermal Resistance , Junction-to -Ambient	-	-	40	℃/W

Electrical Characteristics(Tc=25℃)

Characteristics		Symbol	Test Condition	Min	Type	Max	Unit
Gate leakage current		I_{GSS}	V_{GS}=±25V,V_{DS}=0V	-	-	±100	nA
Gate-source breakdown voltage		$V_{(BR)GSS}$	I_G=±10 μA,V_{DS}=0V	±30	-	-	V
Drain cut -off current		I_{DSS}	V_{DS}=500V,V_{GS}=0V	-	-	1	μA
			V_{DS}=400V,Tc=125℃			10	
Drain -source breakdown voltage		$V_{(BR)DSS}$	I_D=10 mA,V_{GS}=0V	500	-	-	V
Breakdown voltage Temperature coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA,Referenced to 25℃	-	0.53	-	V/℃
Gate threshold voltage		$V_{GS(th)}$	V_{DS}=10V,I_D=1mA	3.0	-	5.0	V
Drain -source ON resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=9A	-	0.16	0.19	Ω
Forward Transconductance		gfs	V_{DS}=40V,I_D=9A	-	22	-	S
Input capacitance		C_{iss}	V_{DS}=25V,	-	3500	4500	pF
Reverse transfer capacitance		C_{rss}	V_{GS}=0V,	-	55	70	
Output capacitance		C_{oss}	f=1MHz	-	520	670	
Switching time	Rise time	tr	V_{DD}=250V,	-	250	500	ns
	Turn-on time	ton	I_D=18A	-	80	170	
	Fall time	tf	R_G=25Ω	-	155	320	
	Turn-off time	toff	(Note4,5)	-	200	400	
Total gate charge(gate-source plus gate-drain)		Qg	V_{DD}=400V,	-	90	120	nC
Gate-source charge		Qgs	V_{GS}=10V,	-	23	-	
Gate-drain("miller") Charge		Qgd	I_D=18A (Note4,5)	-	44	-	

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

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I_{DR}	-	-	-	24	A
Pulse drain reverse current	I_{DRP}	-	-	-	96	A
Forward voltage(diode)	V_{DSF}	I_{DR}=24A,V_{GS}=0V	-	-	1.4	V
Reverse recovery time	trr	I_{DR}=24A,V_{GS}=0V,	-	400	-	ns
Reverse recovery charge	Qrr	dI_{DR} / dt =100 A / μs	-	4.3	-	μC

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

2.L=3.4mH I_{AS}=24A,V_{DD}=50V,R_G=25Ω,Starting T_J=25℃

3.I_{SD}≤24A,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

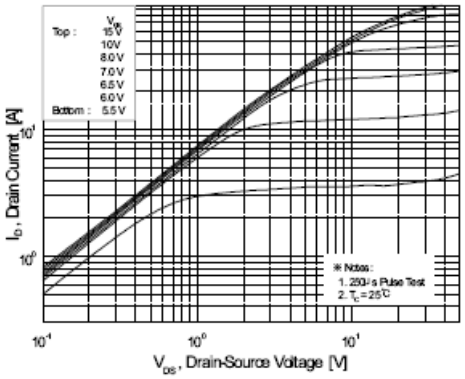


Fig.1 On State Characteristics

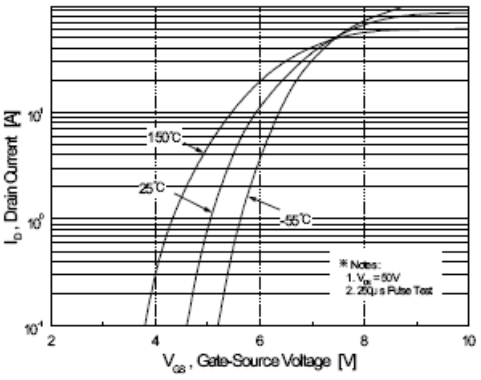


Fig.2 Transfer Current Characteristics

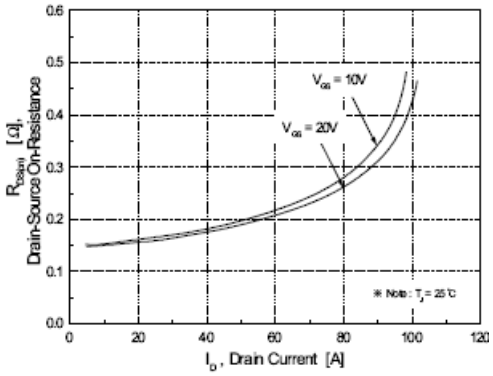


Fig.3 On-Resistance Variation vs Drain Current and gate voltage

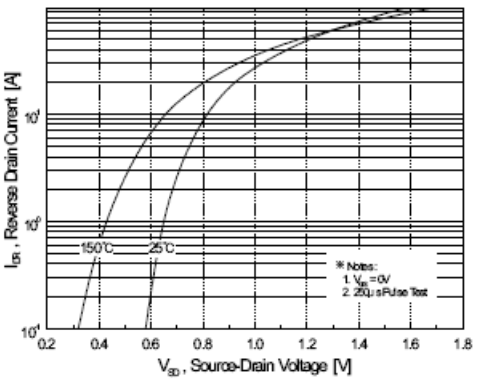


Fig.4 Body Diode Forward Voltage Variation with Source Current and Temperature

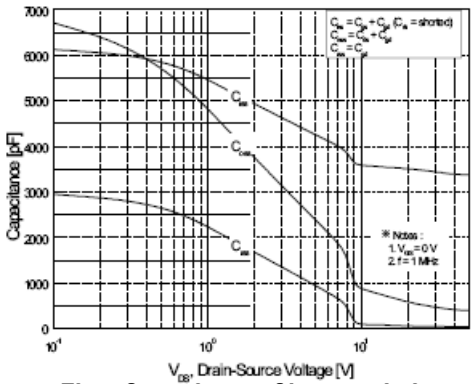


Fig.5 Capacitance Characteristics

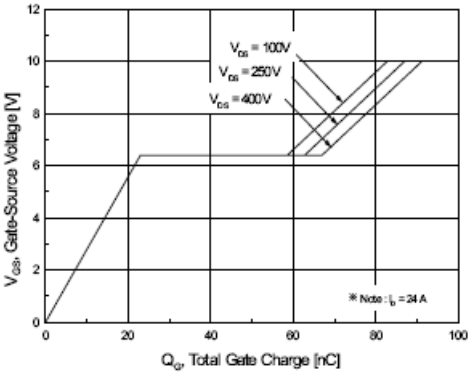


Fig.6 Gate Charge Characteristics

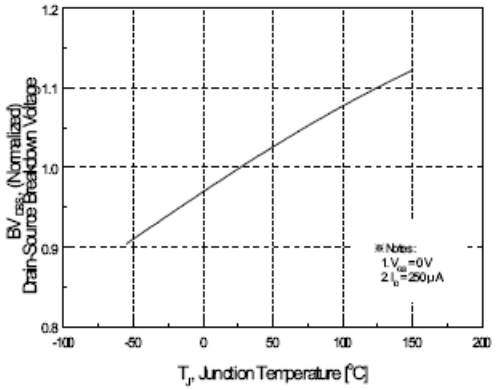


Fig.7 Breakdown Voltage Variation

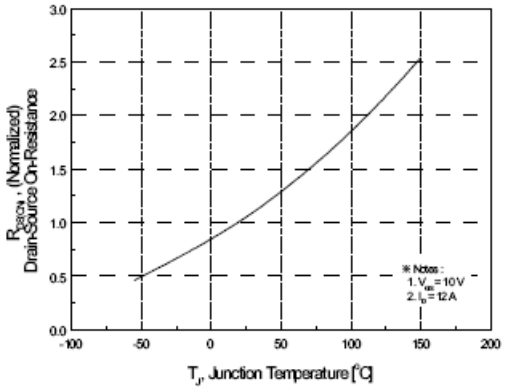


Fig.8 On-Resistance Variation vs.Temperature

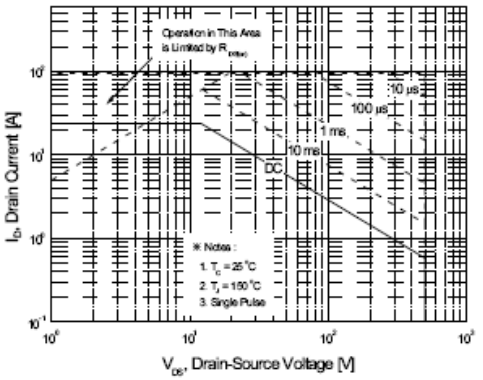


Fig.9 Maximum Safe Operation Area

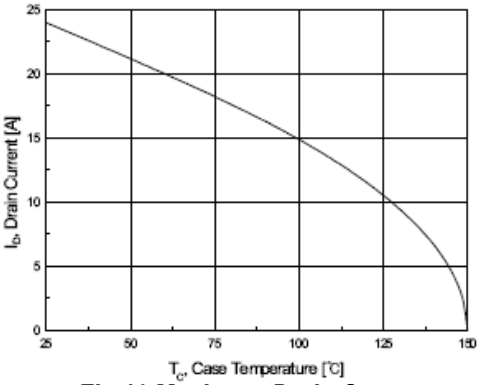


Fig.10 Maximum Drain Current vs Case Temperature

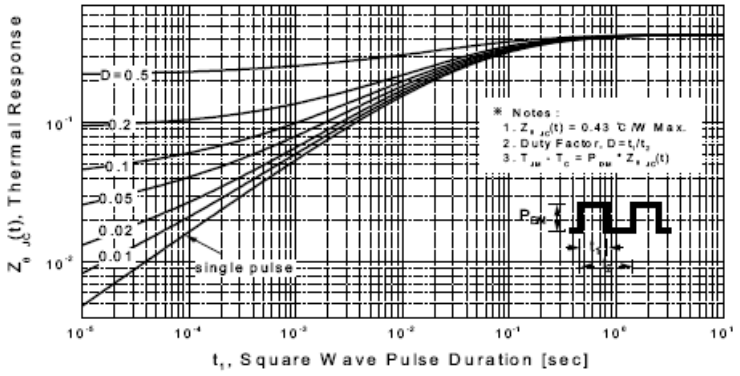


Fig.11 Transient Thermal Response Curve

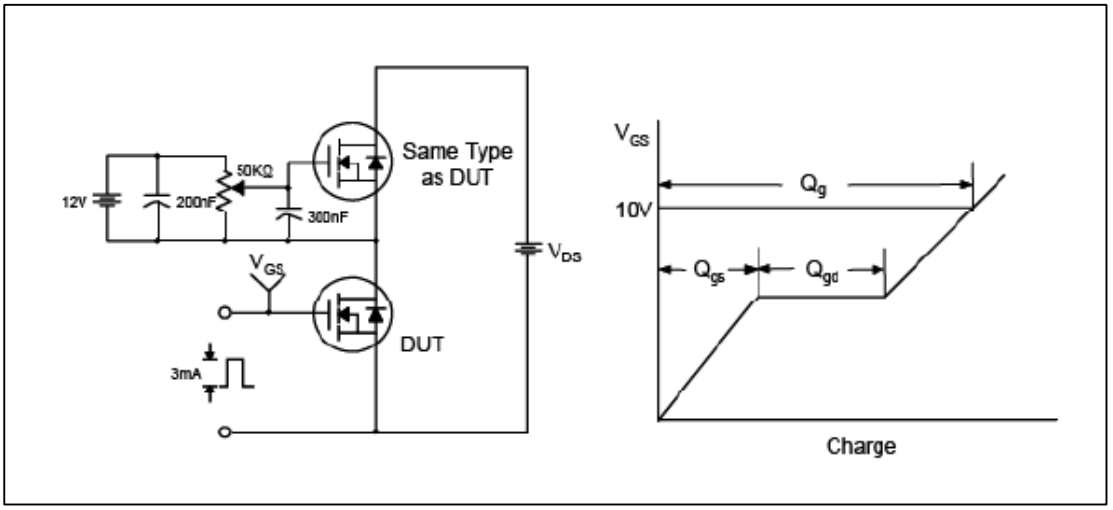


Fig.12 Gate Test Circuit & Waveform

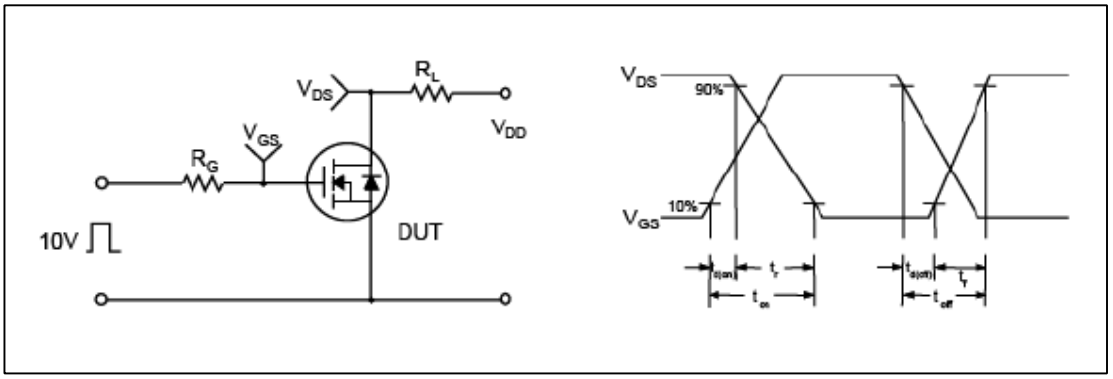


Fig.13 Resistive Switching Test Circuit & Waveform

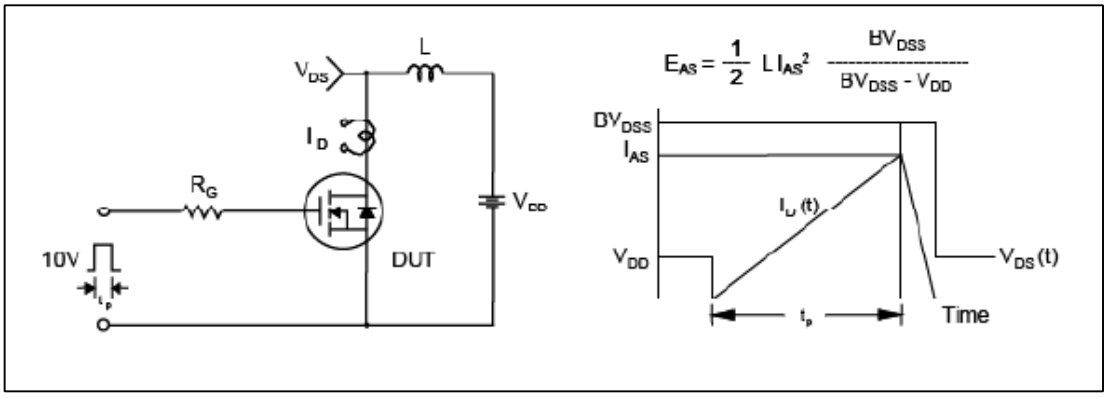


Fig.14 Unclamped Inductive Switching Test Circuit &

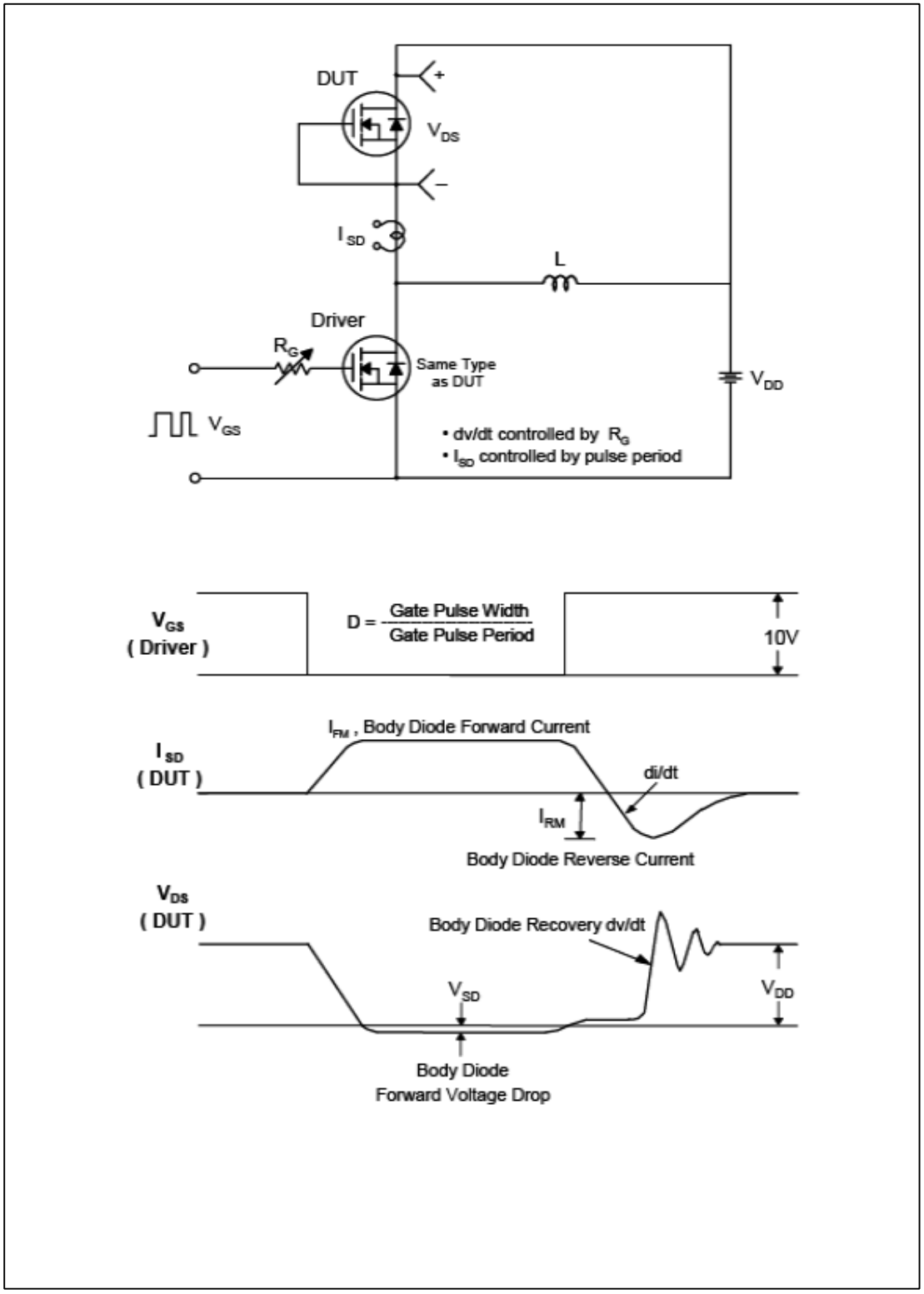


Fig.15 Peak Diode Recovery dv/dt Test Circuit & Waveform

TO-3PN Package Dimension

Unit:mm