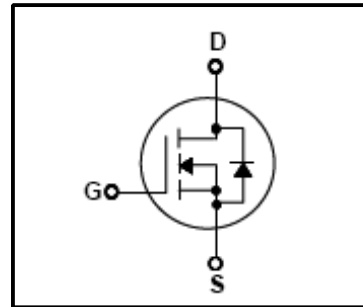


Silicon N-Channel MOSFET

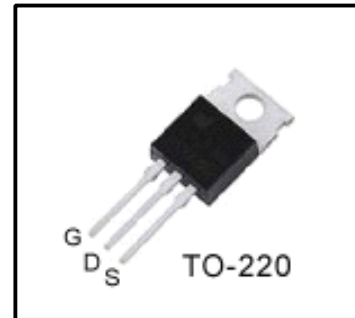
Features

- 13A,500V, $R_{DS(on)}$ (Max0.46 Ω)@ $V_{GS}=10V$
- Ultra-low Gate charge(Typical 43nC)
- Fast Switching Capability
- 100%Avalanche Tested
- Maximum Junction Temperature Range(150 $^{\circ}C$)



General Description

This Power MOSFET is produced using Winsemi's trench layout-based process. This technology improves the performances compared with standard parts from various sources. All of these power MOSFETs are designed for applications in switching regulators, switching converters, motor and relay drivers, and drivers for high power bipolar switching transistors demanding high speed and low gate drive power.



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain Source Voltage	500	V
I_D	Continuous Drain Current(@ $T_c=25^{\circ}C$)	13	A
	Continuous Drain Current(@ $T_c=100^{\circ}C$)	8	A
I_{DM}	Drain Current Pulsed (Note1)	52	A
V_{GS}	Gate to Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note2)	845	mJ
E_{AR}	Repetitive Avalanche Energy (Note1)	5	mJ
dv/dt	Peak Diode Recovery dv /dt (Note3)	3.5	V/ ns
P_D	Total Power Dissipation(@ $T_c=25^{\circ}C$)	195	W
	Derating Factor above 25 $^{\circ}C$	1.56	W/ $^{\circ}C$
T_J, T_{stg}	Junction and Storage Temperature	-55~150	$^{\circ}C$
T_L	Channel Temperature	300	$^{\circ}C$

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJC}	Thermal Resistance , Junction -to -Case	-	-	0.64	$^{\circ}C/W$
R_{QCS}	Thermal Resistance , Case-to-Sink	-	0.5	-	$^{\circ}C/W$
R_{QJA}	Thermal Resistance , Junction-to -Ambient	-	-	62.5	$^{\circ}C/W$

Electrical Characteristics(Tc=25°C)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit	
Gate leakage current	I _{GSS}	V _{GS} =±30V,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°C			10	μA	
Drain -source breakdown voltage	V _{(BR)DSS}	I _D =250 μA,V _{GS} =0V	500	-	-	V	
Breakdown voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA,Referenced to 25°C	-	0.5	-	V/°C	
Gate threshold voltage	V _{GS(th)}	V _{DS} =10V,I _D =250 μA	3	-	4.5	V	
Drain -source ON resistance	R _{DS(ON)}	V _{GS} =10V,I _D =6.5A	-	0.37	0.46	Ω	
Forward Transconductance	g _{fs}	V _{DS} =50V,I _D =6.5A	-	15	-	S	
Input capacitance	C _{iss}	V _{DS} =25V,	-	1580	2055	pF	
Reverse transfer capacitance	C _{rss}	V _{GS} =0V,	-	21	26		
Output capacitance	C _{oss}	f=1MHz	-	180	235		
Switching time	Rise time	tr	V _{DD} =250V, I _D =13A R _G =9.1Ω R _D =31Ω (Note4,5)	-	25	60	ns
	Turn-on time	ton		-	100	210	
	Fall time	tf		-	130	270	
	Turn-off time	toff		-	100	210	
Total gate charge(gate-source plus gate-drain)	Q _g	V _{DD} =400V, V _{GS} =10V,	-	43	56	nC	
Gate-source charge	Q _{gs}	I _D =13A	-	7.5	-		
Gate-drain("miller") Charge	Q _{gd}	(Note4,5)	-	18.5	-		

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

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I _{DR}	-	-	-	13	A
Pulse drain reverse current	I _{DRP}	-	-	-	52	A
Forward voltage(diode)	V _{DSF}	I _{DR} =13A,V _{GS} =0V	-	-	1.4	V
Reverse recovery time	trr	I _{DR} =13A,V _{GS} =0V,	-	442	633	ns
Reverse recovery charge	Q _{rr}	dI _{DR} / dt =100 A / μs	-	2.16	3.24	μC

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

2.L=500uH I_{AS}=13A,V_{DD}=50V,R_G=0Ω,Starting T_J=25°C

3.I_{SD}≤13A,di/dt≤300A/us,V_{DD}<BV_{DSS},STARTING T_J=25°C

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

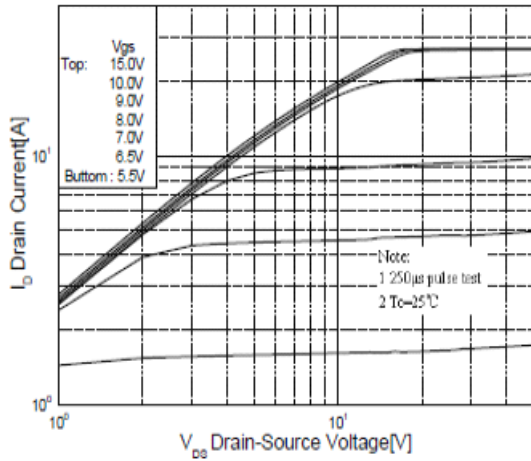


Fig.1 On State Characteristics

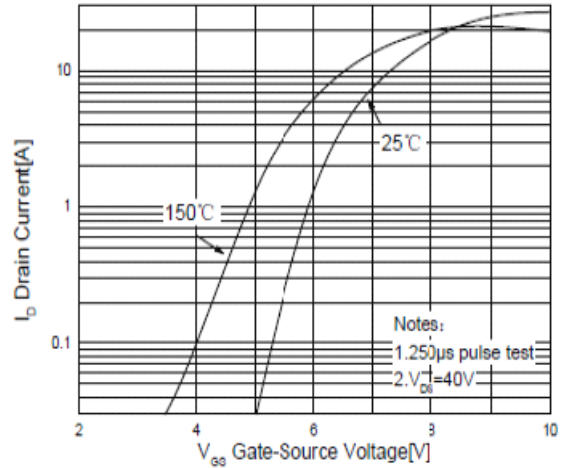


Fig.2 Transfer Characteristics

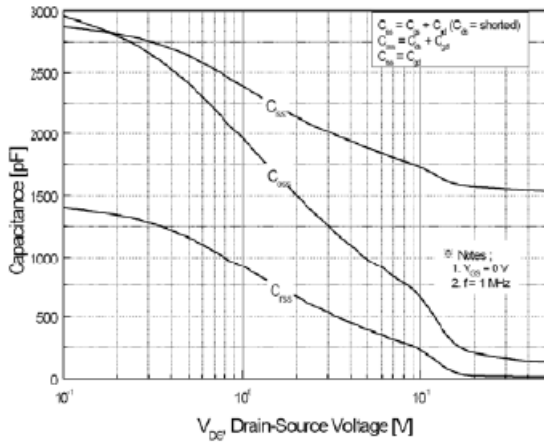


Fig.3 Capacitance Variation vs Drain Voltage

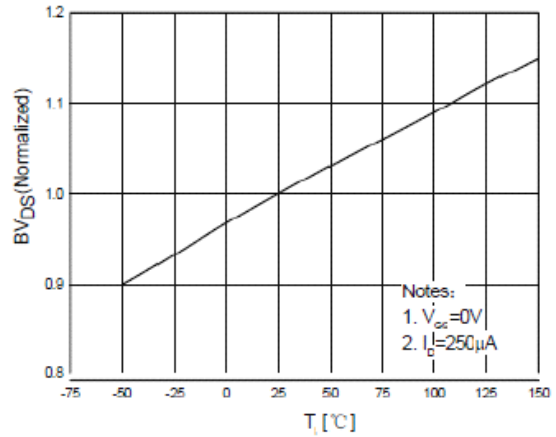


Fig.4 Maximum Avalanche Energy vs On-State Current

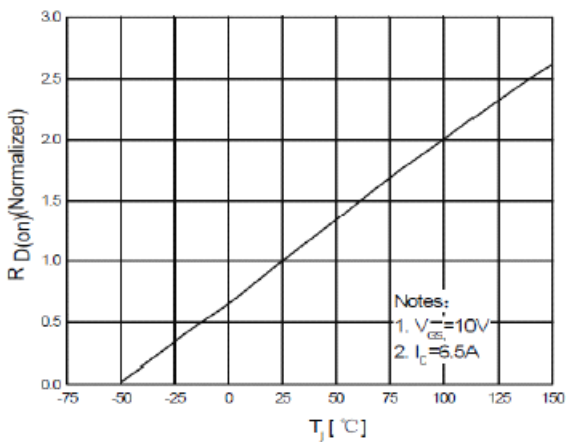


Fig.5 On-Resistance Variation vs Junction temperature

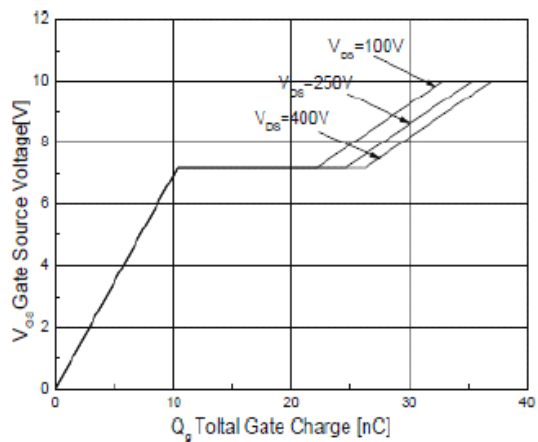


Fig.6 Gate Charge Characteristics

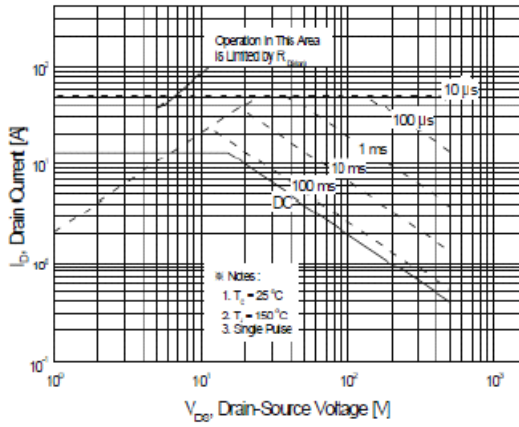


Fig.7 Maximum Safe Operation Area

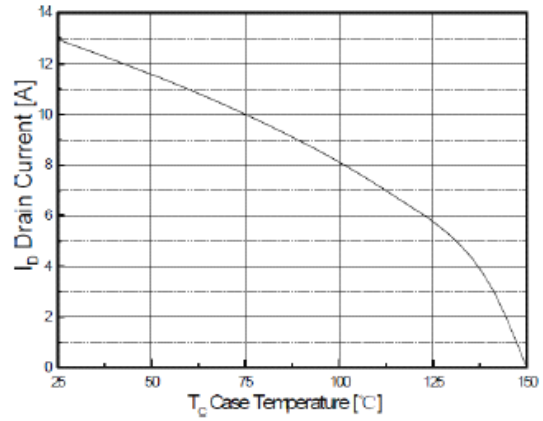


Fig.8 Maximum Drain Current vs Case temperature

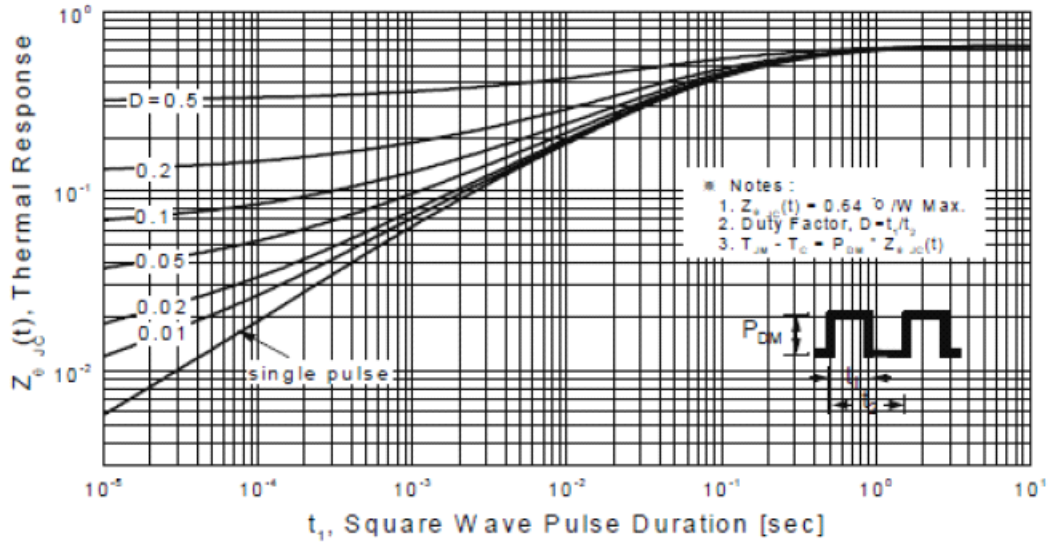


Fig.9 Transient thermal Response Curve

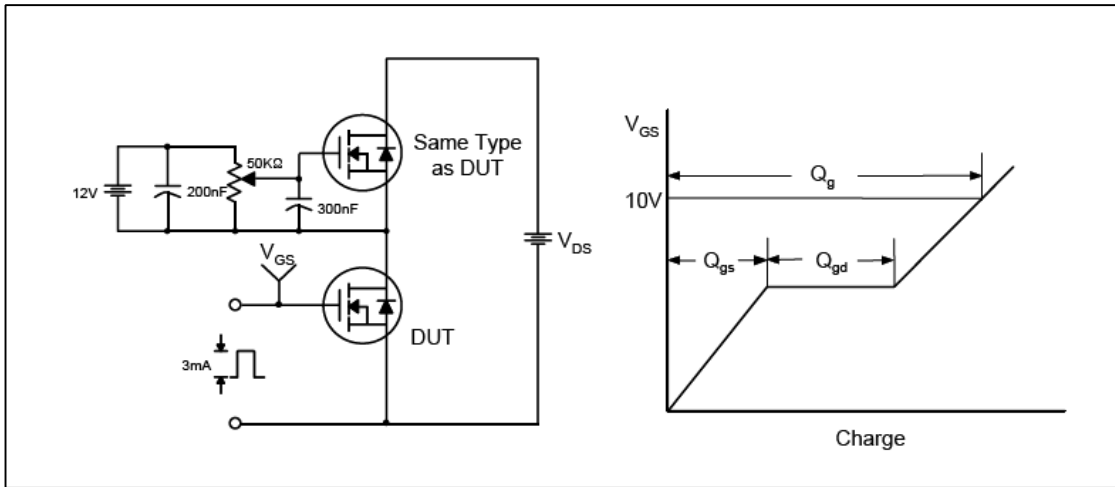


Fig.10 Gate Test circuit & Waveform

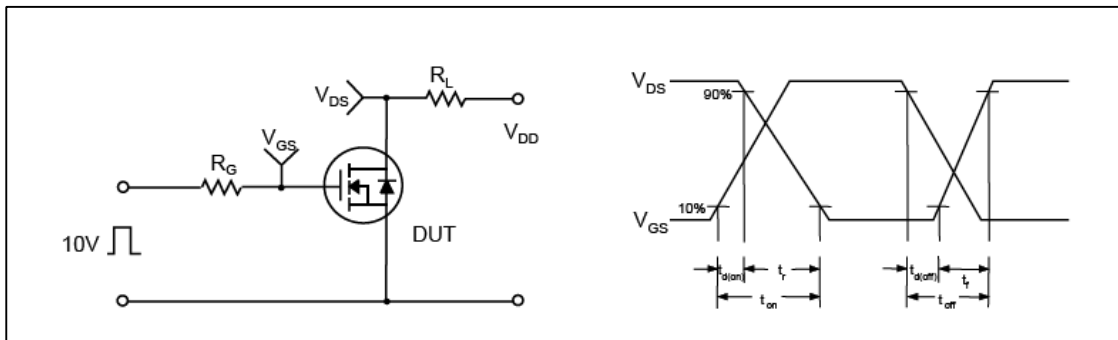


Fig.11 Resistive Switching Test Circuit & Waveform

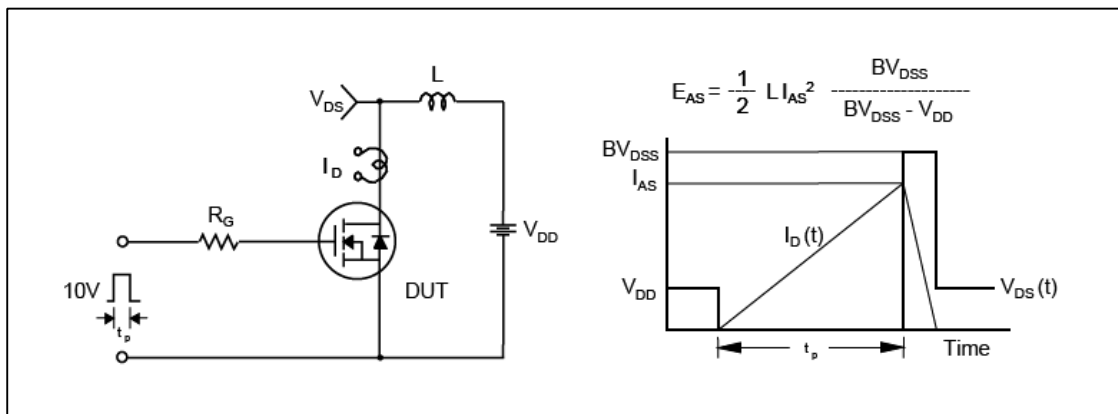


Fig.12 Unclamped Inductive Switching Test Circuit & Waveform

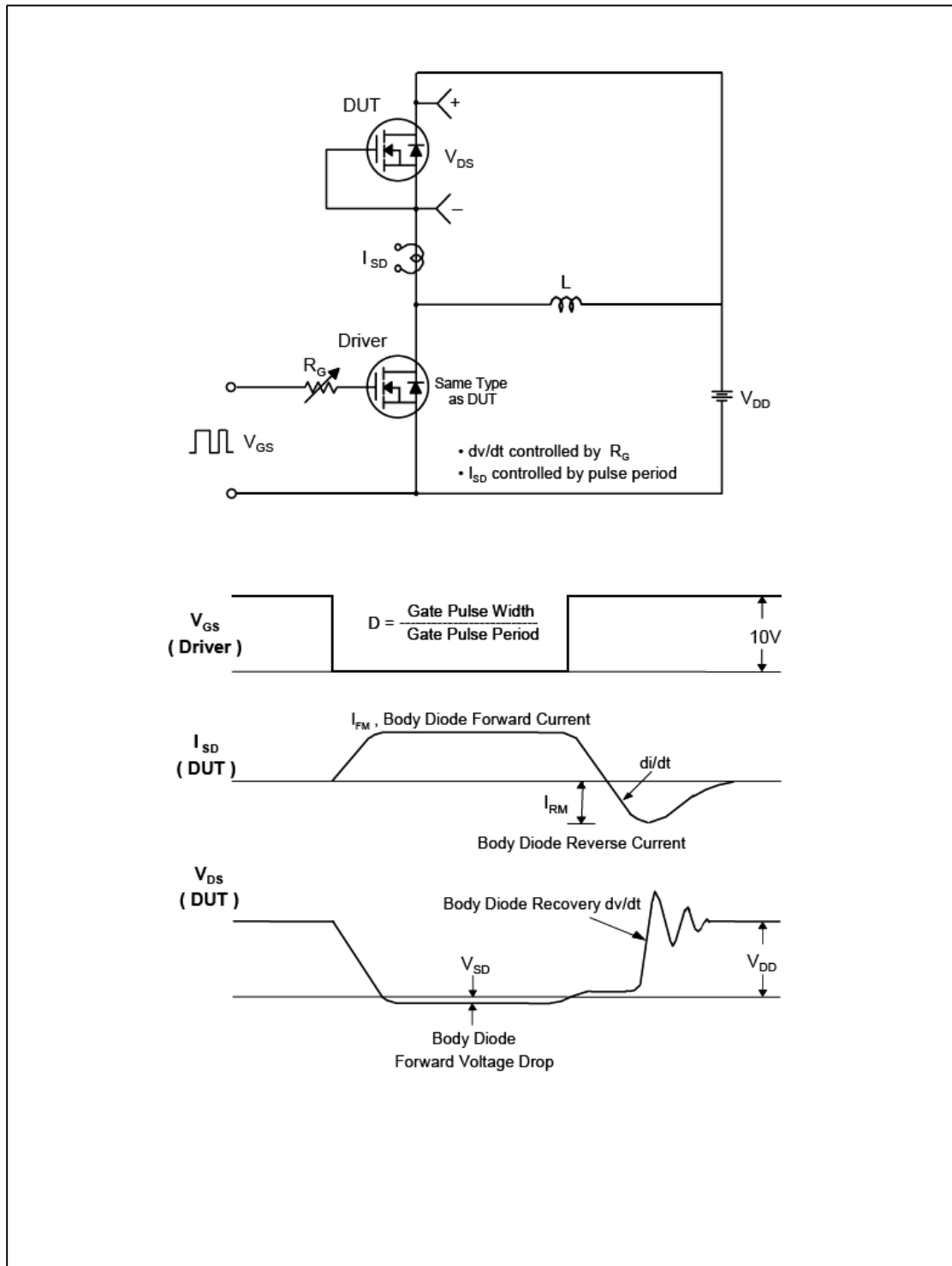


Fig.13 Peak Diode Recovery dv/dt Test Circuit & Waveform

TO-220 Package Dimension

