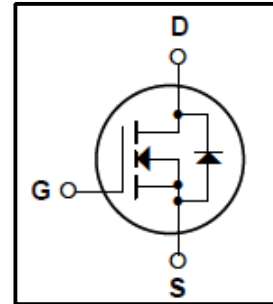


## Silicon N-Channel MOSFET

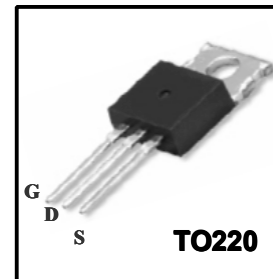
### Features

- 9A, 200V,  $R_{DS(on)}$  (Max 0.4 $\Omega$ )@ $V_{GS}=10V$
- Ultra-low Gate Charge (Typical 43nC)
- Fast Switching Capability
- 100% Avalanche Tested
- Maximum Junction Temperature Range (150°C)



### General Description

This Power MOSFET is produced using Winsemi's advanced planar stripe, DMOS 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 low voltage applications such as automotive, high efficiency switching for DC/DC converters, and DC motor control.



### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain Source Voltage	200	V
$I_D$	Continuous Drain Current (@ $T_c=25^\circ C$ )	9	A
	Continuous Drain Current (@ $T_c=100^\circ C$ )	5.7	A
$I_{DM}$	Drain Current Pulsed (Note 1)	36	A
$V_{GS}$	Gate to Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	160	mJ
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	7.2	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
$P_D$	Total Power Dissipation (@ $T_c=25^\circ C$ )	72	W
	Derating Factor above 25°C	0.57	W/°C
$T_J, T_{stg}$	Junction and Storage Temperature	-55~150	°C
$T_L$	Maximum lead Temperature for soldering purposes	300	°C

### Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
$R_{QJC}$	Thermal Resistance, Junction-to-Case	-	-	1.74	°C/W
$R_{QCS}$	Thermal Resistance, Case to Sink	-	0.5	-	°C/W
$R_{QJA}$	Thermal Resistance, Junction-to-Ambient	-	-	62.5	°C/W

**Electrical Characteristics (Tc = 25°C)**

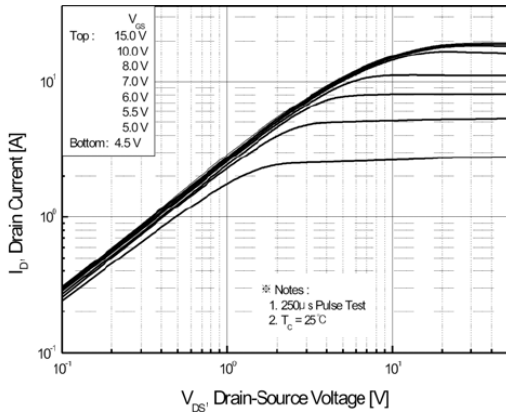
Characteristics	Symbol	Test Condition	Min	Type	Max	Unit	
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	$\pm 100$	nA	
Gate-source breakdown voltage	$V_{(BR)GSS}$	$I_G = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$	$\pm 30$	-	-	V	
Drain cut-off current	$I_{DSS}$	$V_{DS} = 200 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	10	$\mu\text{A}$	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	200	-	-	V	
Break Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	$I_D = 250 \mu\text{A}$ , Referenced to 25°C	-	0.2	-	V/°C	
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = 10 \text{ V}, I_D = 250 \mu\text{A}$	2	-	4	V	
Drain-source ON resistance	$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 5.4 \text{ A}$	-	-	0.4	$\Omega$	
Forward Transconductance	gfs	$V_{DS} = 50 \text{ V}, I_D = 5.4 \text{ A}$	3.8	-	-	S	
Input capacitance	$C_{iss}$	$V_{DS} = 25 \text{ V},$	-	800	-	pF	
Reverse transfer capacitance	$C_{rss}$	$V_{GS} = 0 \text{ V},$	-	76	-		
Output capacitance	$C_{oss}$	$f = 1 \text{ MHz}$	-	240	-		
Switching time	Rise time	$t_r$	$V_{DD} = 100 \text{ V},$ $I_D = 5.9 \text{ A}$ $R_G = 12 \Omega$  (Note4,5)	-	9.4	-	ns
	Turn-on time	$t_{on}$		-	28	-	
	Fall time	$t_f$		-	39	-	
	Turn-off time	$t_{off}$		-	20	-	
Total gate charge (gate-source plus gate-drain)	$Q_g$	$V_{DD} = 160 \text{ V},$ $V_{GS} = 10 \text{ V},$ $I_D = 5.9 \text{ A}$  (Note4,5)	-	43	-	nC	
Gate-source charge	$Q_{gs}$	-	-	7	-		
Gate-drain ("miller") Charge	$Q_{gd}$	-	-	23	-		

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

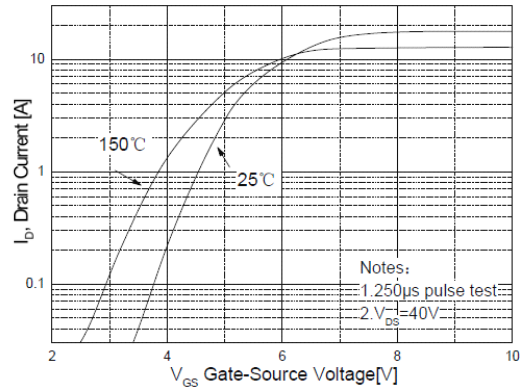
Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	$I_{DR}$	-	-	-	9	A
Pulse drain reverse current	$I_{DRP}$	-	-	-	36	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 9 \text{ A}, V_{GS} = 0 \text{ V}$	-	1.4	2.0	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 5.9 \text{ A}, V_{GS} = 0 \text{ V},$	-	170	340	ns
Reverse recovery charge	$Q_{rr}$	$di_{DR} / dt = 100 \text{ A} / \mu\text{s}$	-	1.1	2.2	$\mu\text{C}$

- Note 1.Repeativity rating :pulse width limited by junction temperature  
 2.L=500uH,I<sub>AS</sub>=9 A,V<sub>DD</sub>=50V,R<sub>G</sub>=0Ω,Starting T<sub>J</sub>=25°C  
 3.I<sub>SD</sub>≤9A,di/dt≤300A/us, V<sub>DD</sub><BV<sub>DSS</sub>,STARTING T<sub>J</sub>=25°C  
 4.Pulse Test: Pulse Width≤300us,Duty Cycle≤2%  
 5.Essentially independent of operating temperature.

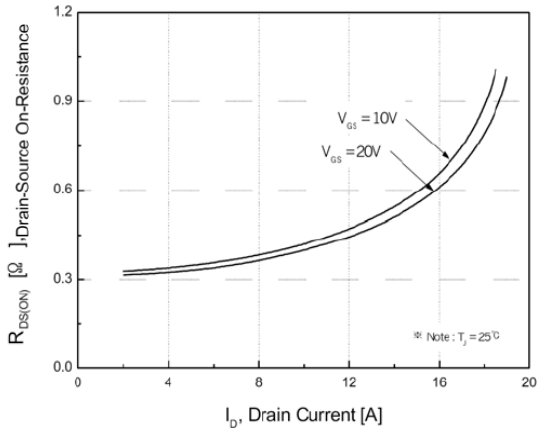
This transistor is an electrostatic sensitive device  
 Please handle with caution



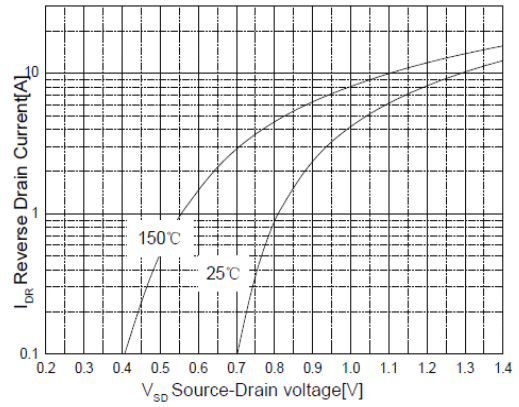
**Fig. 1 On-State Characteristics**



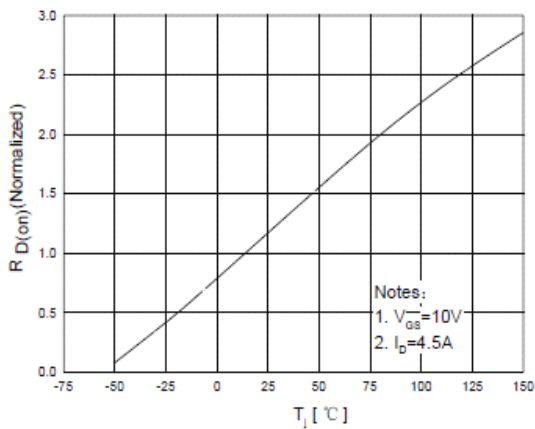
**Fig. 2 Transfer Characteristics**



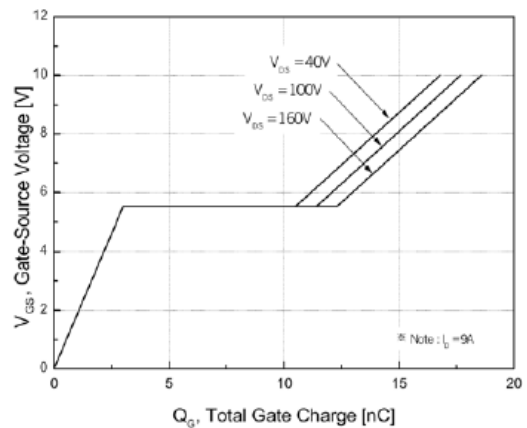
**Fig. 3 On-Resistance Variation vs Drain Current**



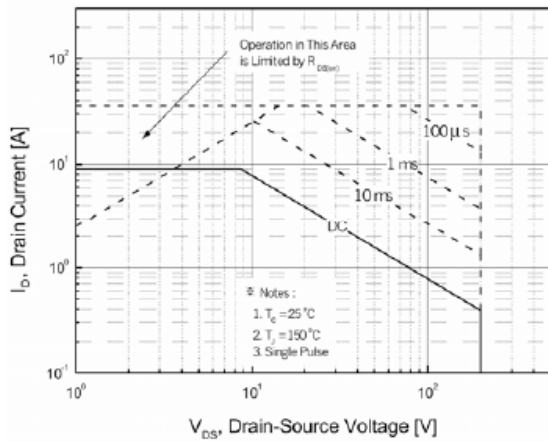
**Fig. 4 Body Diode Forward Voltage Variation vs. Source Current and Temperature**



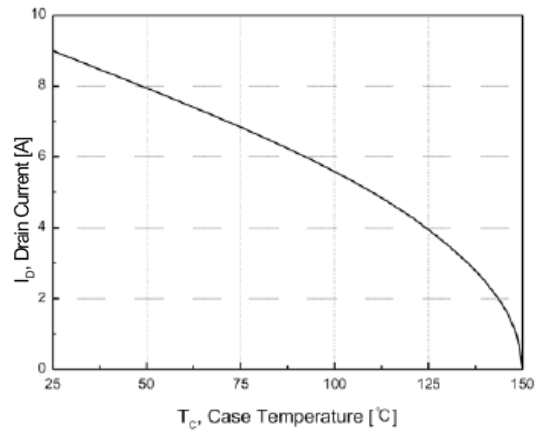
**Fig. 5 On-Resistance Variation vs Junction Temperature**



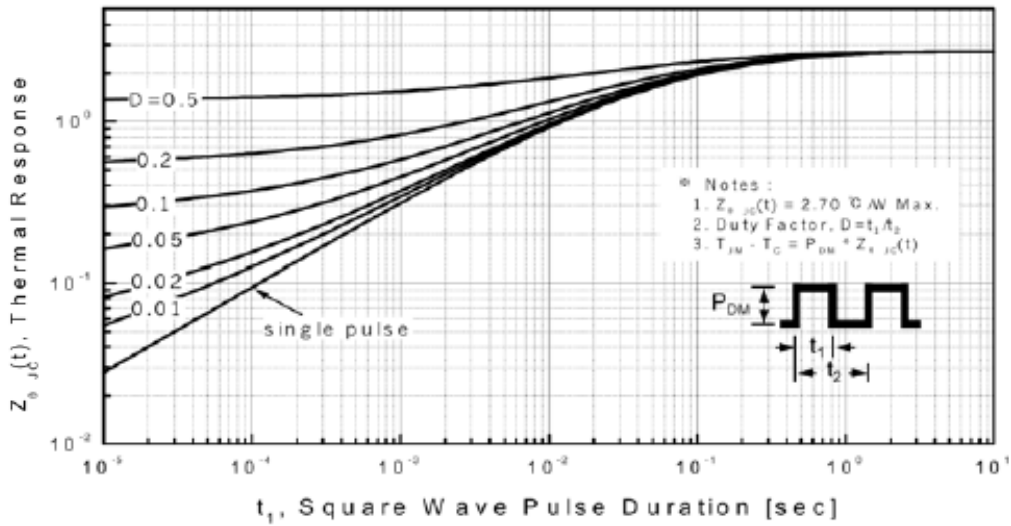
**Fig. 6 Gate Charge Characteristics**



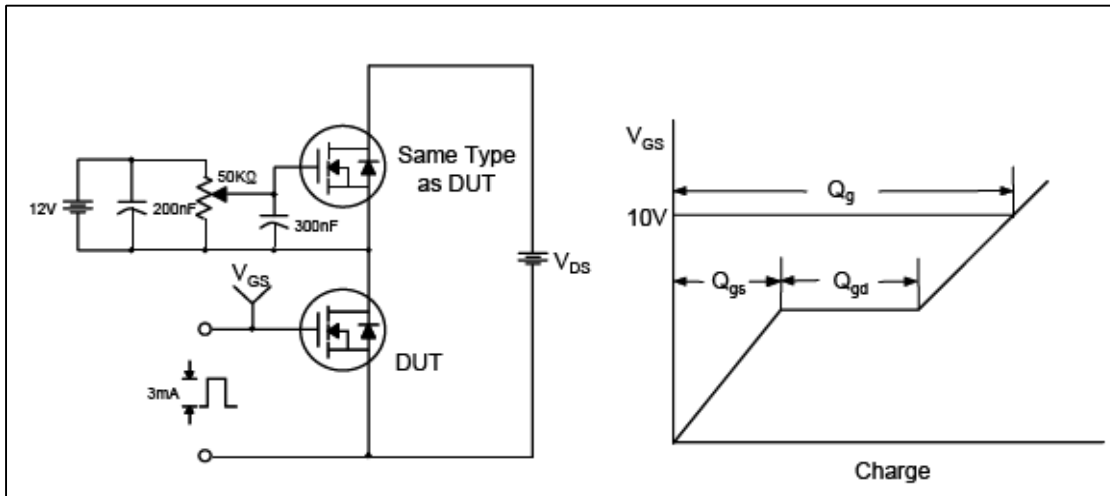
**Fig.7 Maximum Safe Operation Area**



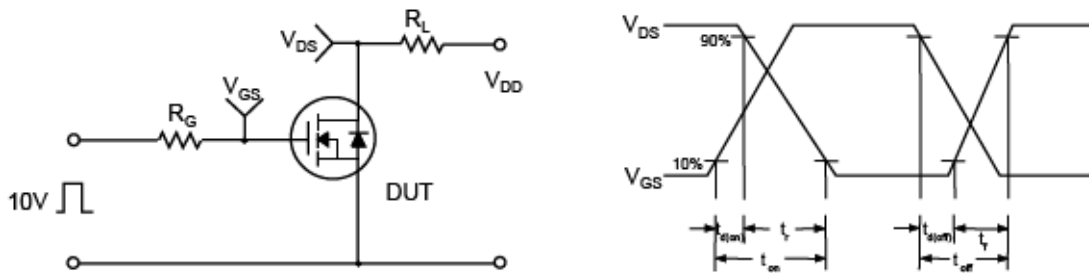
**Fig.8 Maximum Drain Current vs Case Temperature**



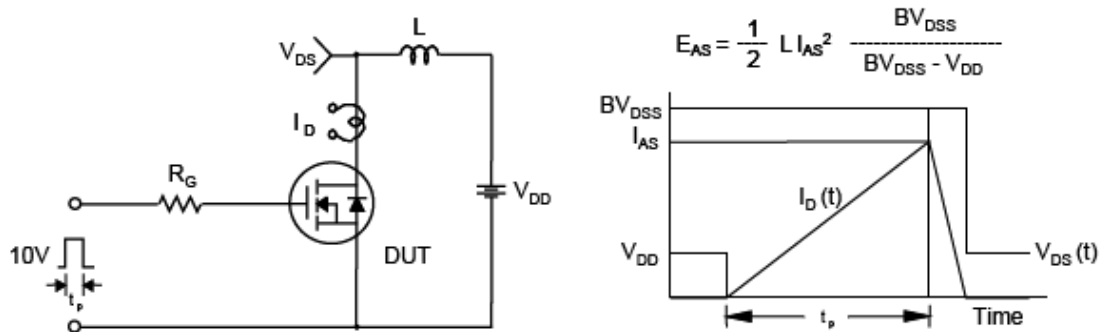
**Fig.9 Transient Thermal Response Curve**



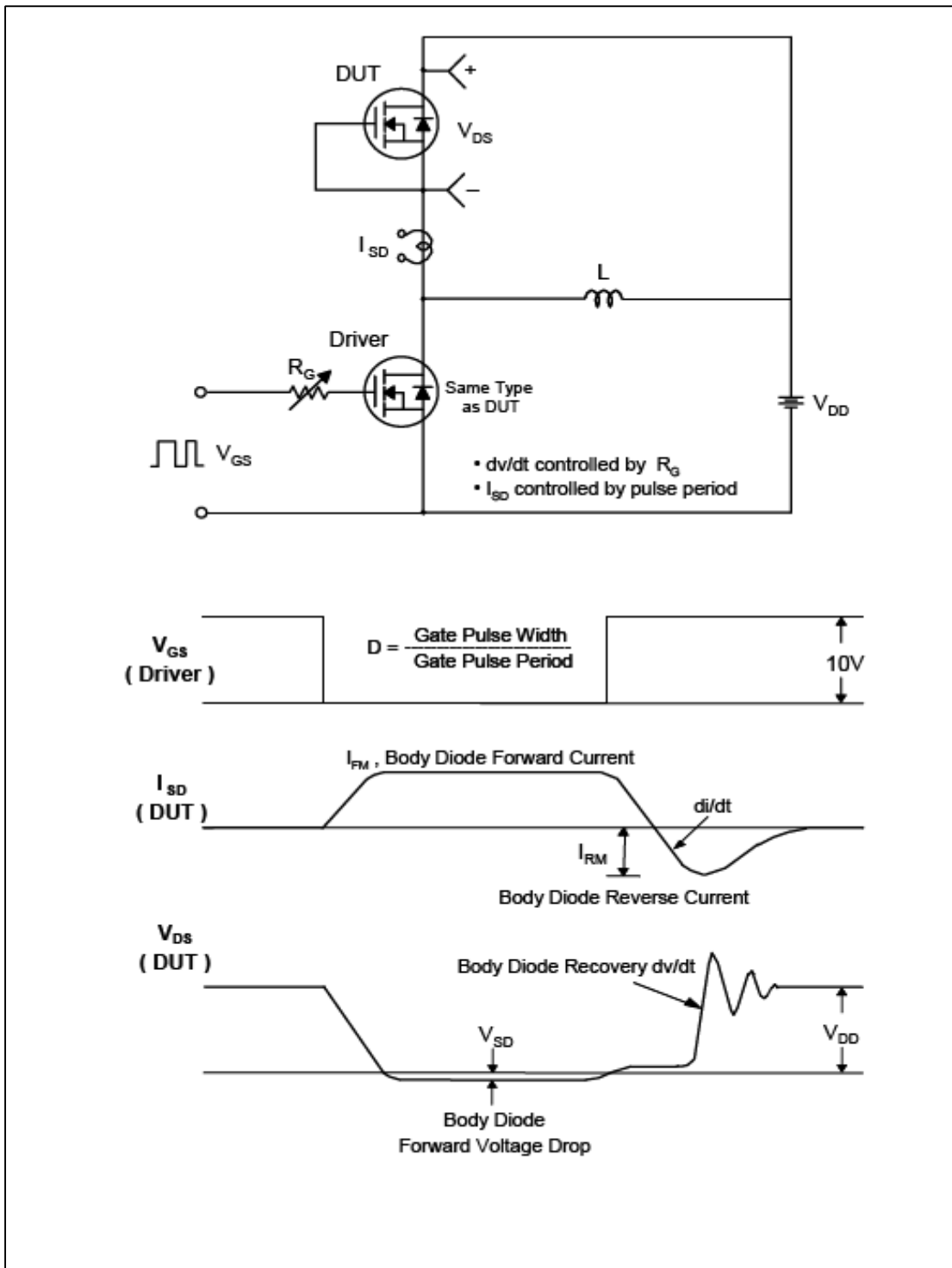
**Fig.10 Gate Test Circuit & Waveform**



**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**

