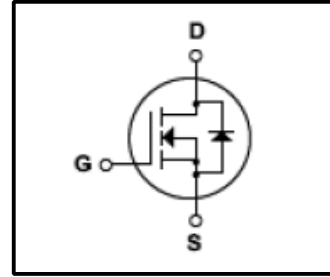
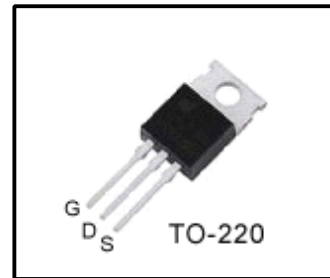


*Silicon N-Channel MOSFET*
**Features**

- 12A,650V, $R_{DS(on)}$ (Max0.8 $\Omega$ )@ $V_{GS}=10V$
- Ultra-low Gate Charge(Typical 51.7nC)
- Fast Switching Capability
- 100%Avalanche Tested
- Maximum Junction Temperature Range(150 $^{\circ}C$ )


**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 AC-DCswitching power supplies, DC-DCpower converters, high voltage H-bridge motor drive PWM


**Absolute Maximum Ratings**

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain Source Voltage	650	V
$I_D$	Continuous Drain Current(@ $T_c=25^{\circ}C$ )	12	A
	Continuous Drain Current(@ $T_c=100^{\circ}C$ )		A
$I_{DM}$	Drain Current Pulsed (Note1)		A
$V_{GS}$	Gate to Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	990	mJ
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	22	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ (Note 3)	4.5	V/ns
$P_D$	Total Power Dissipation(@ $T_c=25^{\circ}C$ )	178	W
	Derating Factor above 25 $^{\circ}C$	1.43	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	-	-	0.70	$^{\circ}C/W$
$R_{QCS}$	Thermal Resistance, Case-to-Sink	-	-	-	$^{\circ}C/W$
$R_{QJA}$	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 <sub>GSS</sub>	V <sub>GS</sub> = ± 30 V, V <sub>DS</sub> = 0 V	-	-	± 100	nA	
Gate-source breakdown voltage	V <sub>(BR)GSS</sub>	I <sub>G</sub> = ± 10 μA, V <sub>DS</sub> = 0 V	± 30	-	-	V	
Drain cut-off current	I <sub>DSS</sub>	V <sub>DS</sub> = 650 V, V <sub>GS</sub> = 0 V	-	-	10	μA	
		V <sub>DS</sub> = 480 V, Tc = 125°C	-	-	100	μA	
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V	650	-	-	V	
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 250 μA	2	-	4	V	
Drain-source ON resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 6A	-	0.64	0.8	Ω	
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = 50 V, I <sub>D</sub> = 6A	-	6.4	-	S	
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25 V,	-	1830	-	pF	
Reverse transfer capacitance	C <sub>rss</sub>	V <sub>GS</sub> = 0 V,	-	155	-		
Output capacitance	C <sub>oss</sub>	f = 1 MHz	-	2.0	-		
Switching time	Rise time	tr	V <sub>DD</sub> = 325 V, I <sub>D</sub> = 12A R <sub>G</sub> = 25 Ω (Note4,5)	-	50	-	ns
	Turn-on time	ton		-	49	-	
	Fall time	tf		-	310	-	
	Turn-off time	toff		-	54	-	
Total gate charge (gate-source plus gate-drain)	Q <sub>g</sub>	V <sub>DD</sub> = 520 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A (Note4,5)	-	51.7	-	nC	
Gate-source charge	Q <sub>gs</sub>	-	-	9.6	-		
Gate-drain ("miller") Charge	Q <sub>gd</sub>	-	-	18.6	-		

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

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I <sub>DR</sub>	-	-	-	12	A
Pulse drain reverse current	I <sub>DRP</sub>	-	-	-	48	A
Forward voltage (diode)	V <sub>DSF</sub>	I <sub>DR</sub> = 12 A, V <sub>GS</sub> = 0 V	-	-	1.4	V
Reverse recovery time	t <sub>rr</sub>	I <sub>DR</sub> = 12 A, V <sub>GS</sub> = 0 V,	-	450	-	ns
Reverse recovery charge	Q <sub>rr</sub>	dI <sub>DR</sub> / dt = 100 A / μs	-	5.0	-	μC

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

2.L=14mH,I<sub>AS</sub>=12A,V<sub>DD</sub>=95V,R<sub>G</sub>=25Ω,Starting T<sub>J</sub>=25°C

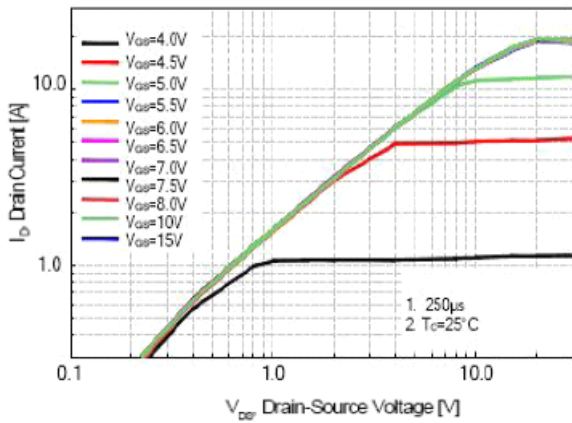
3.I<sub>SD</sub>≤12A,di/dt≤200A/μs, V<sub>DD</sub><BV<sub>DSS</sub>,STARTING T<sub>J</sub>=25°C

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

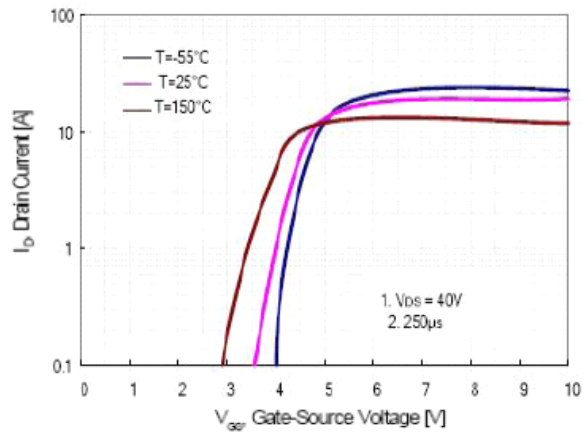
5.Essentially independent of operating temperature.

This transistor is an electrostatic sensitive device

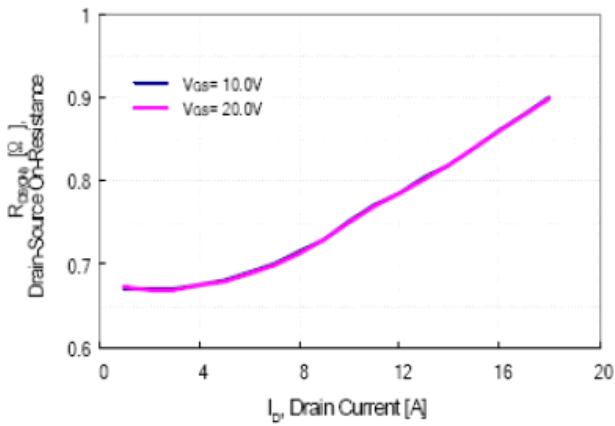
Please handle with caution



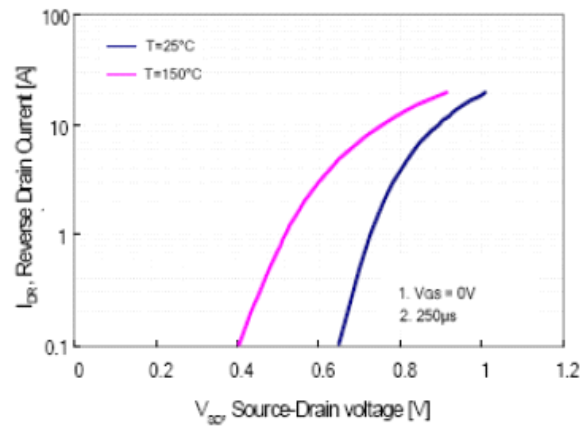
**Fig.1 On-State Characteristics**



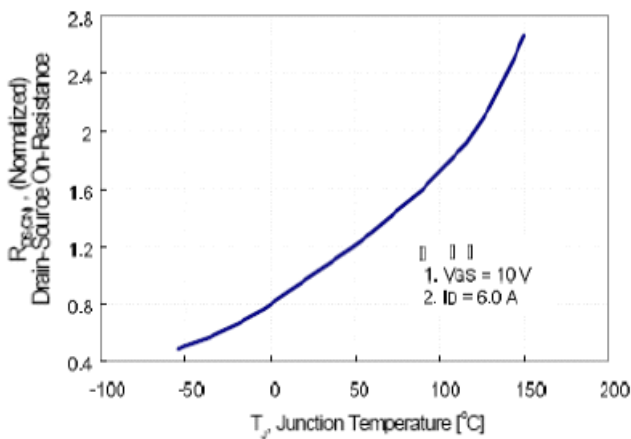
**Fig.2 Transfer Current Characteristics**



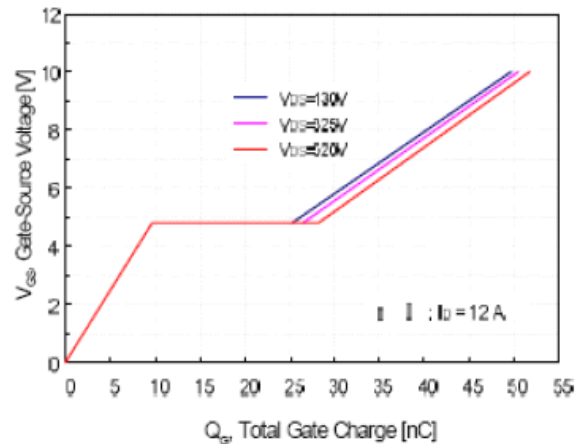
**Fig.3 On-Resistance variation vs Drain Current**



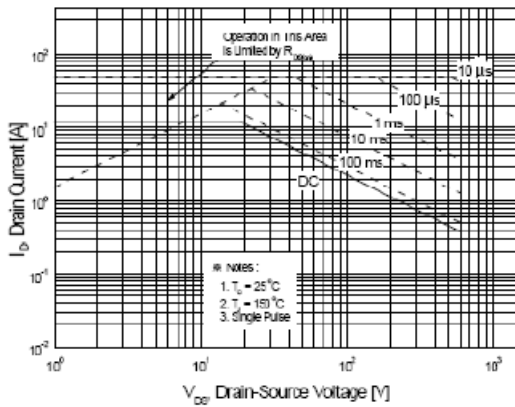
**Fig.4 Body Diode Forward Voltage Variation with Source Current and Temperature**



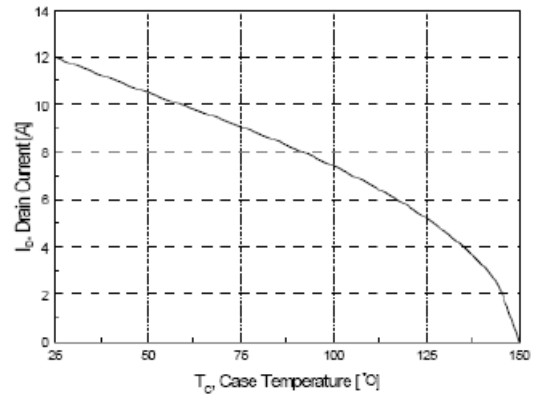
**Fig.8 On-Resistance Variation vs Junction Temperature**



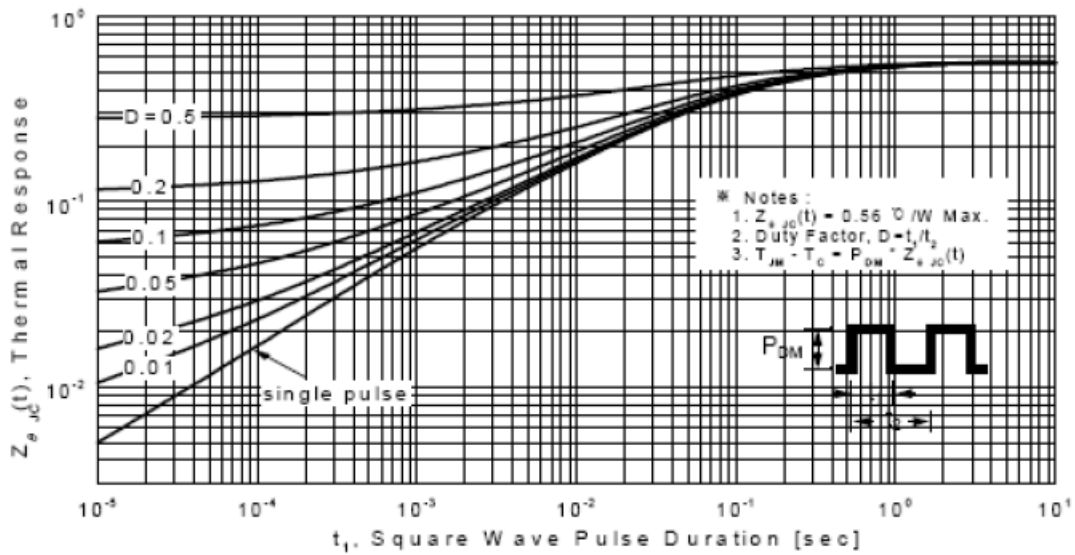
**Fig.6 Gate Charge Characteristics**



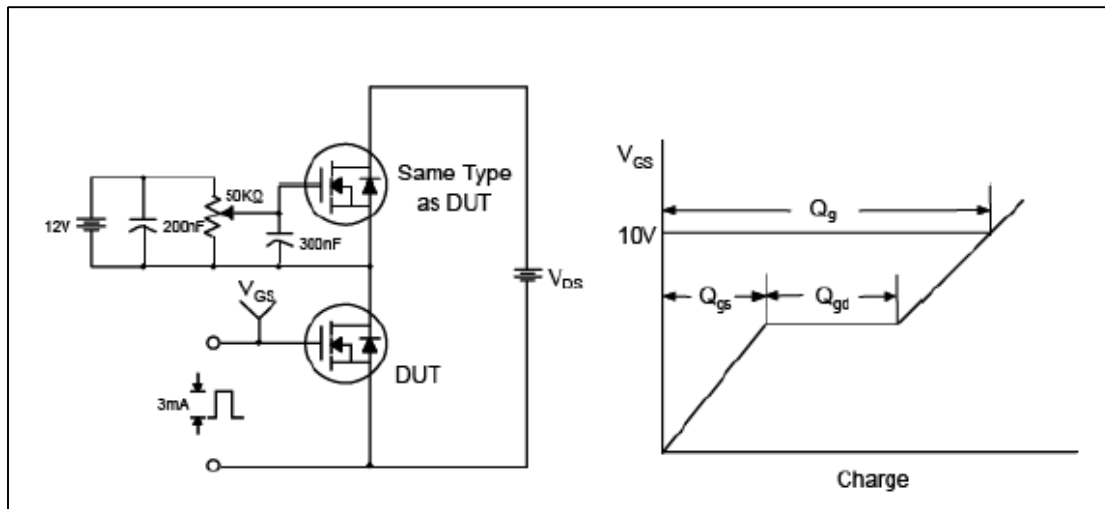
**Fig.7 Maximum Safe Operation Area**



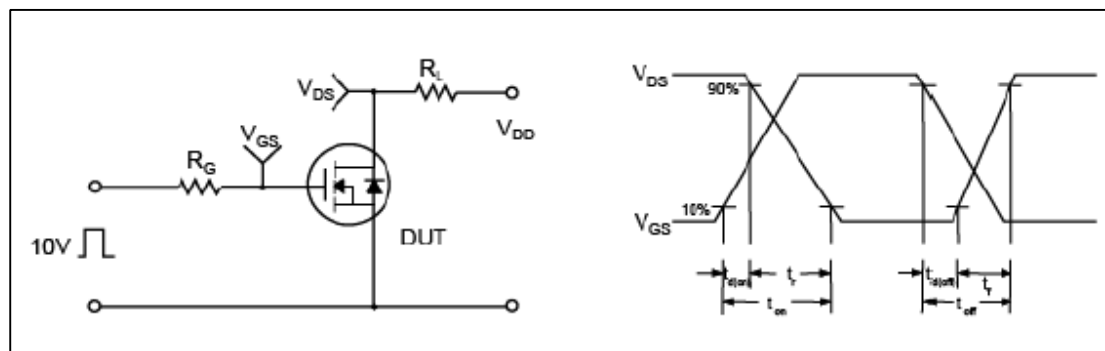
**Fig.8 Maximum Drain Current vs Case Temperature**



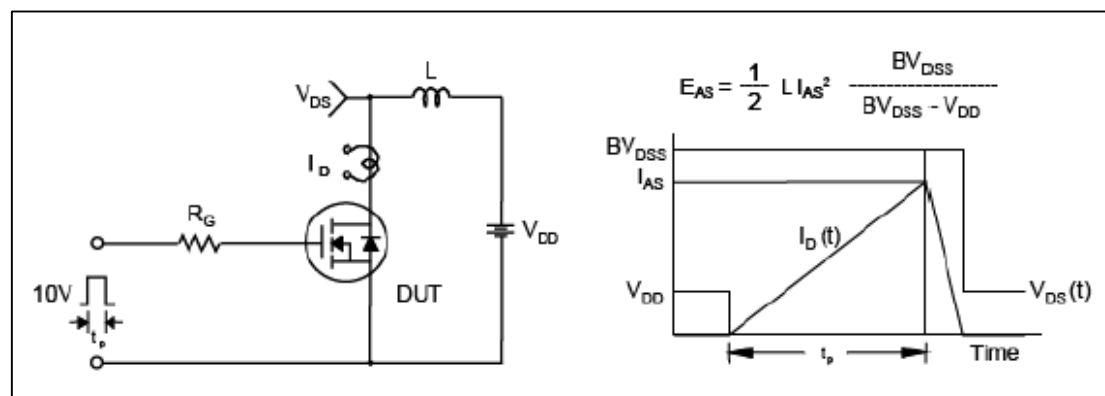
**Fig.9 Transient Thermal Response curve**



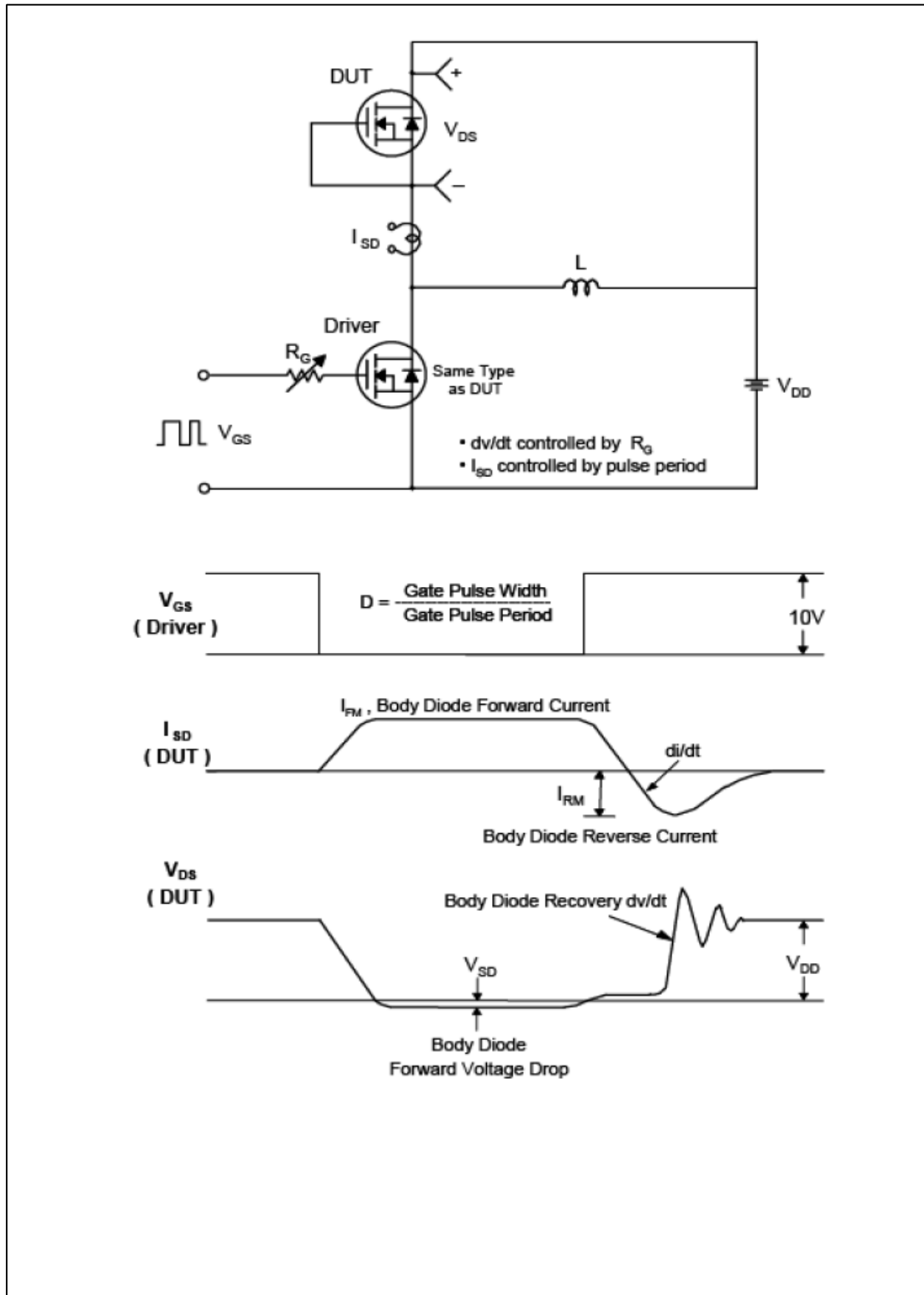
**Fig.10 Gate Test circuit & Waveform**



**Fig.11 Resistive Switching Test Circuit & Waveform**



**Fig.12 Uncamped Inductive Switching Test Circuit & Waveform**



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

**TO-220 Package Dimension**

