

MSW20N50

500V N-Channel MOSFET

Description

This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. These devices are well suited for high efficiency switch mode power supplies.

Features

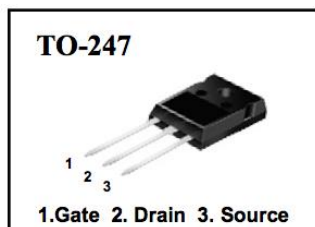
- RDS(on) (Typical 0.26Ω)@VGS=10V
- Gate Charge (Typical 90nC)
- Improved dv/dt Capability, High Ruggedness
- 100% EAS Test
- Extended Safe Operating Area
- RoHS compliant package

Application

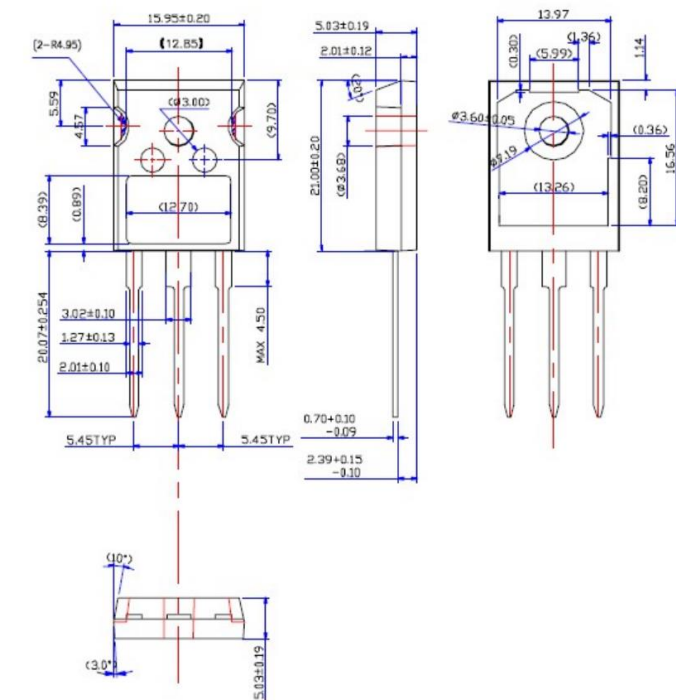
- High current, High speed switching
- PFC (Power Factor Correction)
- SMPS (Switched Mode Power Supplies)

Packing & Order Information

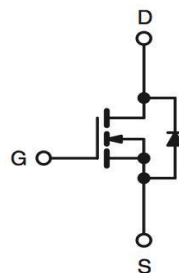
50/Tube ; 1,000/Box



RoHS
COMPLIANT



Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	500	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current -Continuous (TC=25°C)	20	A
	Drain Current -Continuous (TC=100°C)	13	A
I _{DM}	Drain Current Pulsed	80	A
E _{AS}	Single Pulsed Avalanche Energy	1400	mJ
E _{AR}	Repetitive Avalanche Energy	21	mJ

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Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
P _D	Power Dissipation (TC = 25 °C)	215	W
	- Derate above 25°C	2.1	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +175	°C

Note:

1. Pulse width limited by maximum junction temperature
2. Duty cycle ≤ 1%

Thermal Resistance Characteristics

Symbol	Parameter	Max.	Units
R _{thjc}	Typical thermal resistance	0.64	°C/W
R _{θJA}		40	

Static Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
V _{GS}	V _{DS} = V _{GS} , I _D = 250μA	3.0	--	5.0	V
*R _{DS(ON)}	V _{GS} = 10 V, I _D = 10 A	--	0.21	0.26	Ω
BV _{DSS}	V _{GS} = 0 V, I _D = 250μA	500	--	--	V
ΔBV _{DSS} /ΔT _J	I _D = 250μA, Referenced to 25°C	--	0.5	--	V/°C
I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V V _{DS} = 400 V, V _{GS} = 0 V, T _j = 125°C	--	--	1 10	μA
I _{GSS}	V _{GS} = ±30	--	--	±100	nA

Dynamic Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
t _{d(on)}	V _{DS} = 250 V, I _D = 20 A, R _G = 25 Ω	--	60	138	ns
t _r		--	210	462	ns
t _{d(off)}		--	170	357	ns
t _f		--	130	286	ns
Q _g	V _{DS} = 400 V, I _D = 20 A, V _{GS} = 10 V	--	90	117	nC
Q _{gs}		--	20	26	nC
Q _{gd}		--	43	56	nC
C _{ISS}	V _{DS} = 25 V, V _{GS} = 0 V, F = 1.0MHz	--	3350	4355	pF
C _{OSS}		--	490	637	pF
C _{RSS}		--	50	65	pF

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Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S			--	--	20	A
I_{SM}			--	--	80	
V_{SD}	$I_S = I_F$, $V_{GS} = 0\text{ V}$		--	--	1.4	V
t_{rr}	$I_S = I_F$, $diF/dt = 100\text{A}/\mu\text{s}$		--	370	--	ns
Q_{rr}			--	3.8	--	uC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=20\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. $I_{SD}\leq 20\text{A}$, $di/dt\leq 300\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$
4. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

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■ Typical Characteristics

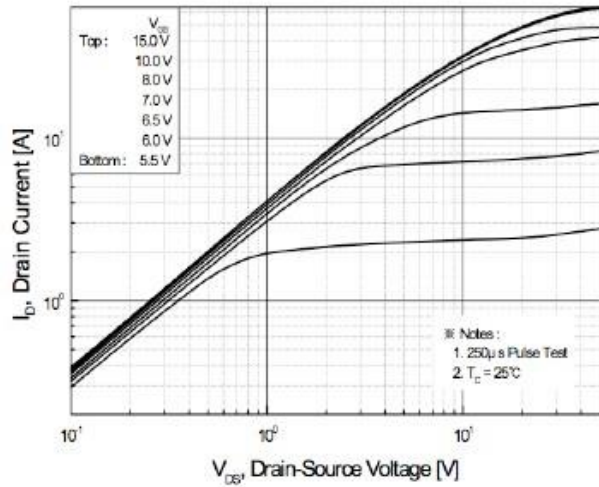


FIG.1-ON REGION CHARACTERISTICS

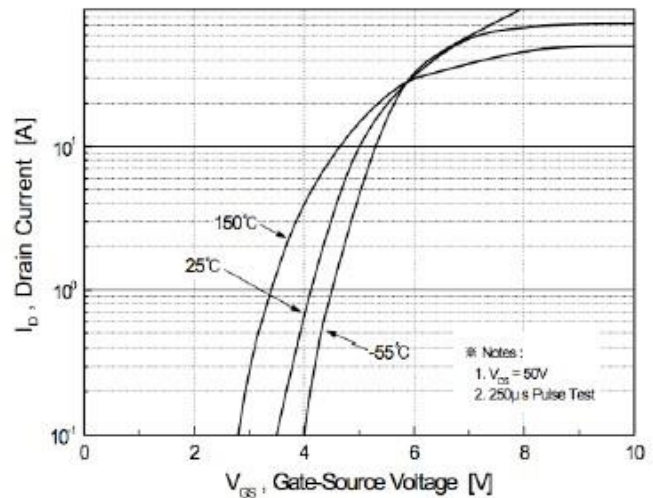


FIG.2-TRANSFER CHARACTERISTICS

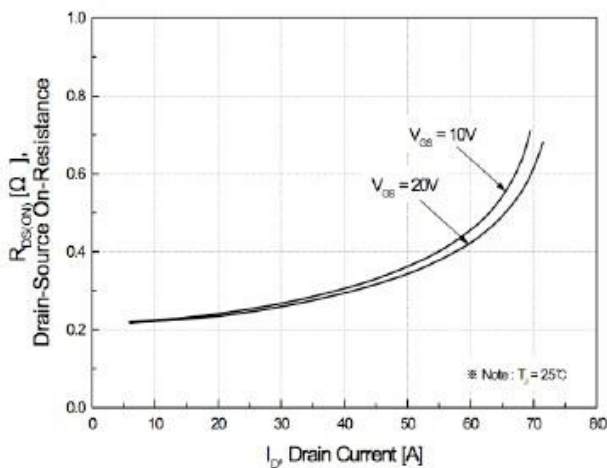


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

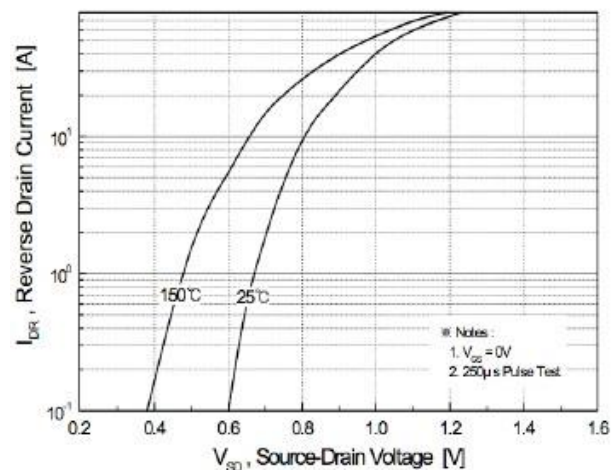


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

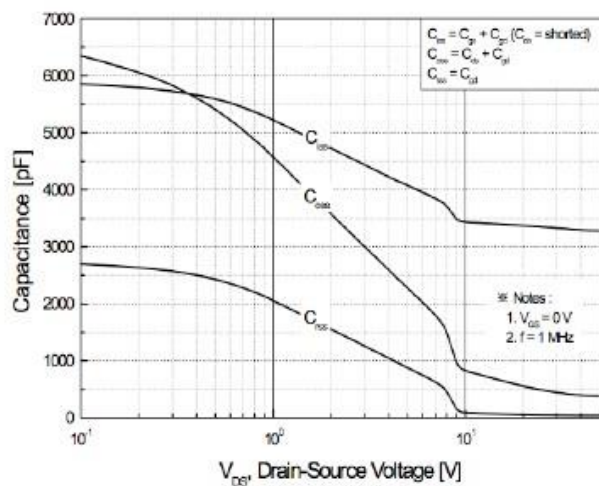


FIG.5-CAPACITANCE CHARACTERISTICS

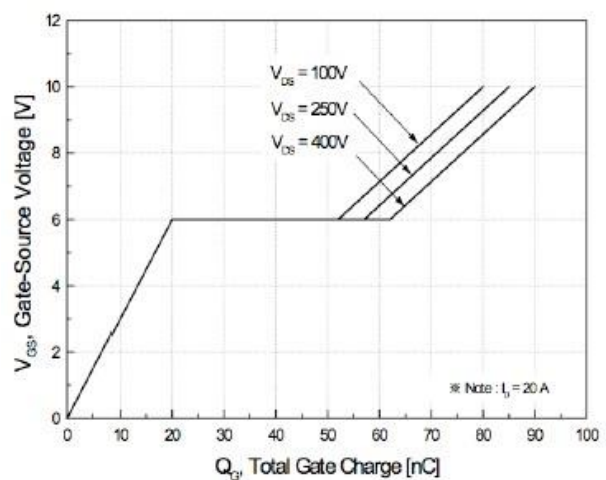


FIG.6-GATE CHARGE CHARACTERISTICS

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■ Typical Characteristics

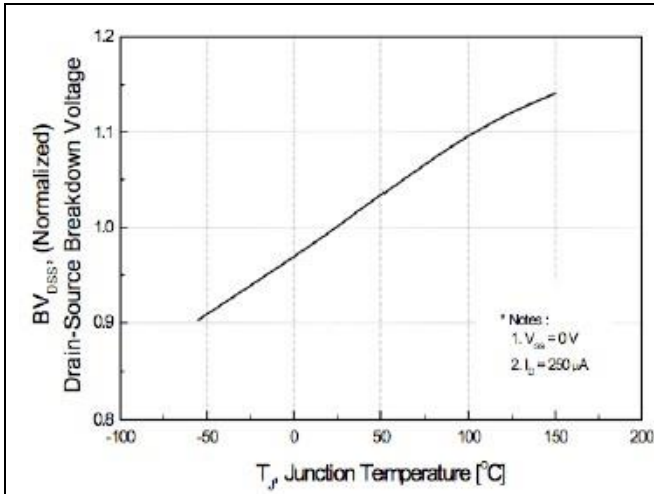


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

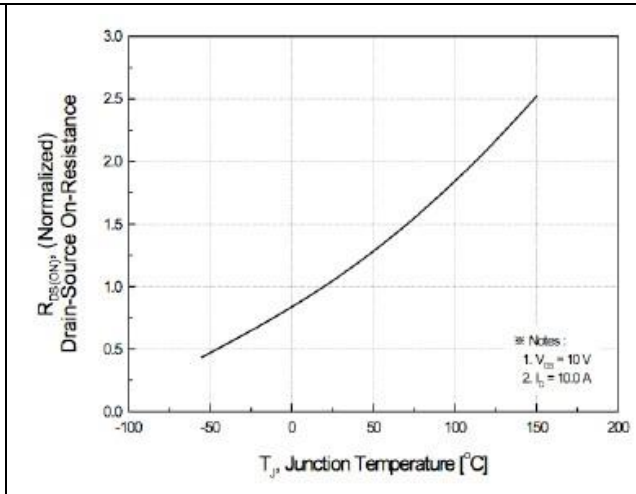


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

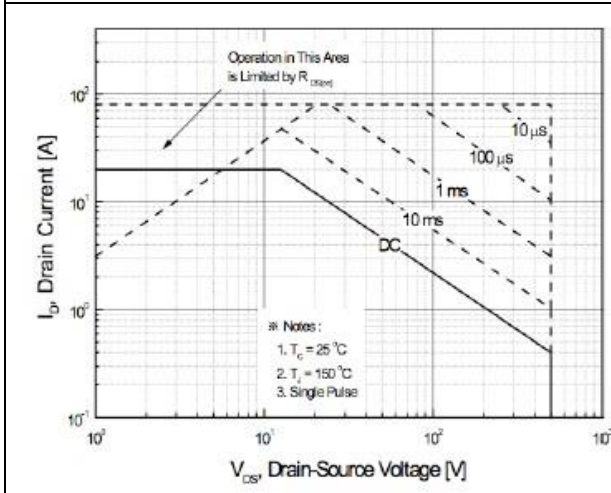


FIG.9-MAXIMUM SAFE OPERATING AREA

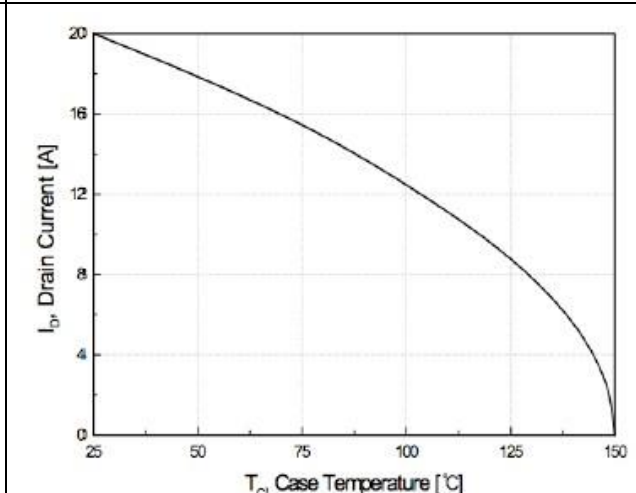


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

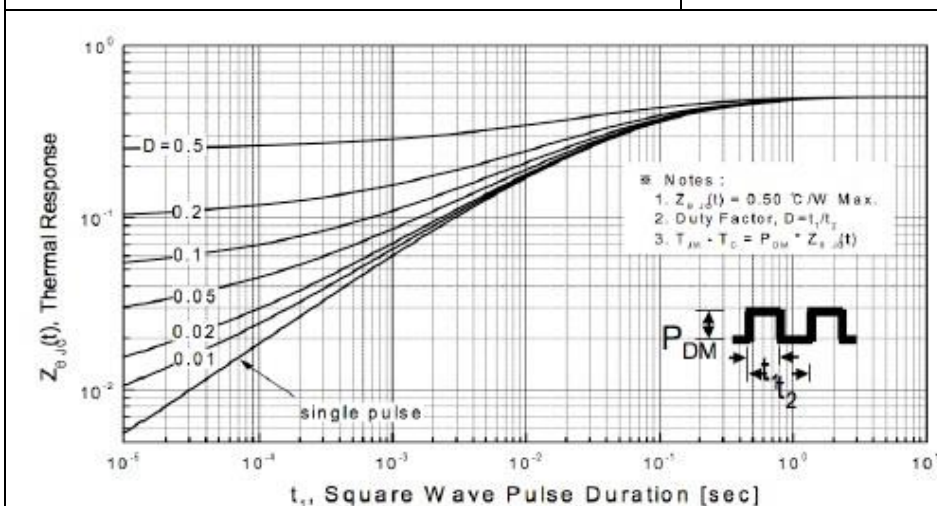


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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■ Characteristics Test Circuit & Waveform

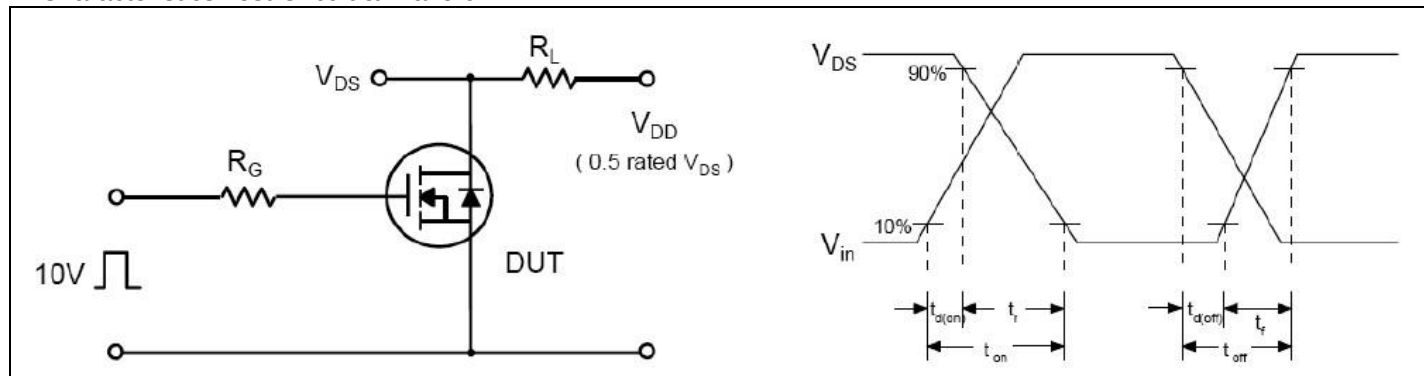


Fig 12. Resistive Switching Test Circuit & Waveforms

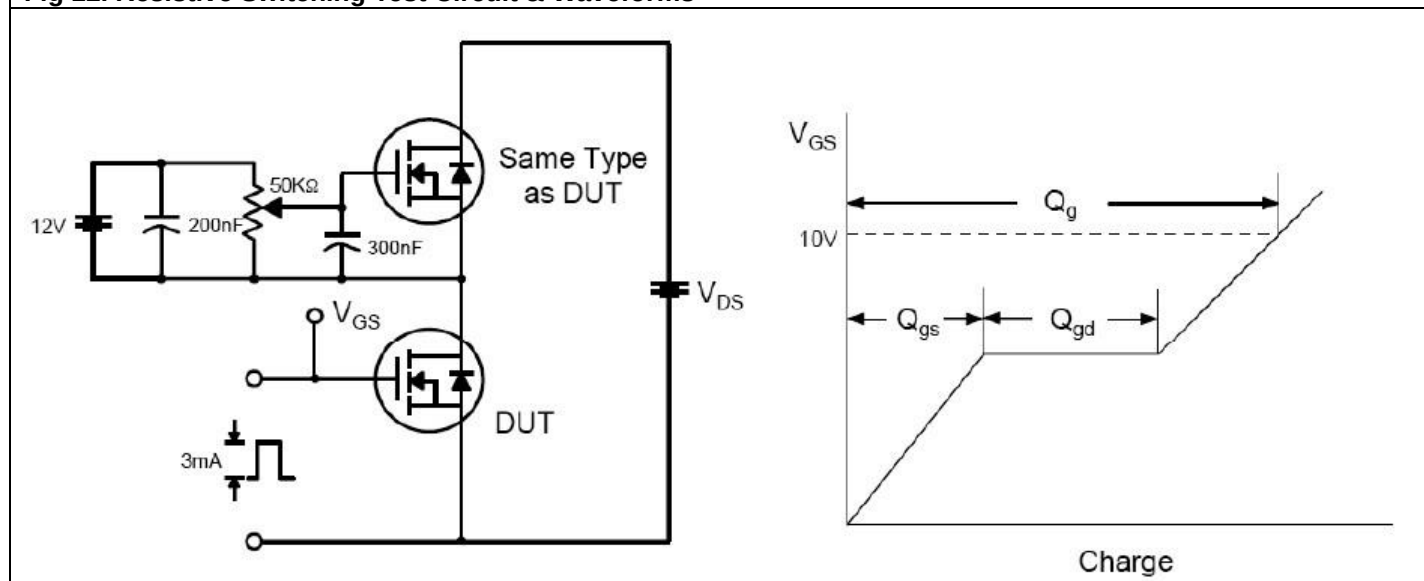


Fig 13. Gate Charge Test Circuit & Waveform

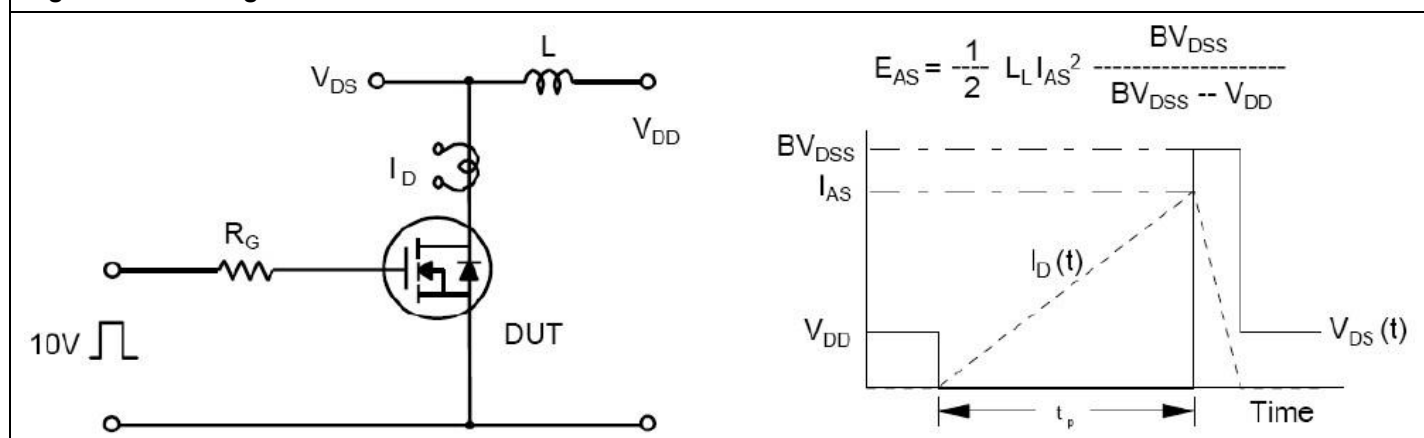


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

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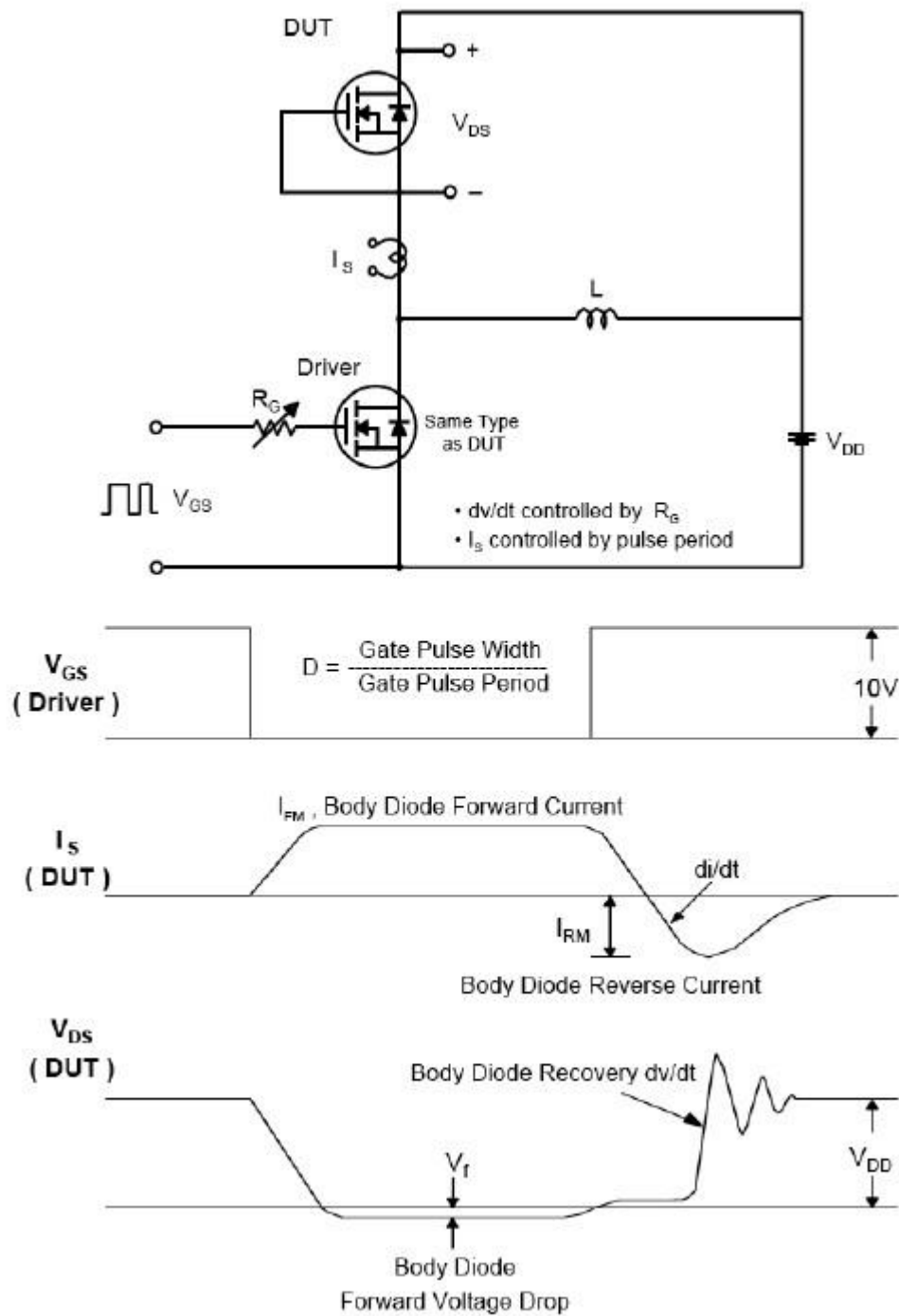


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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