MSF2N60

600V N-Channel MOSFET

Description

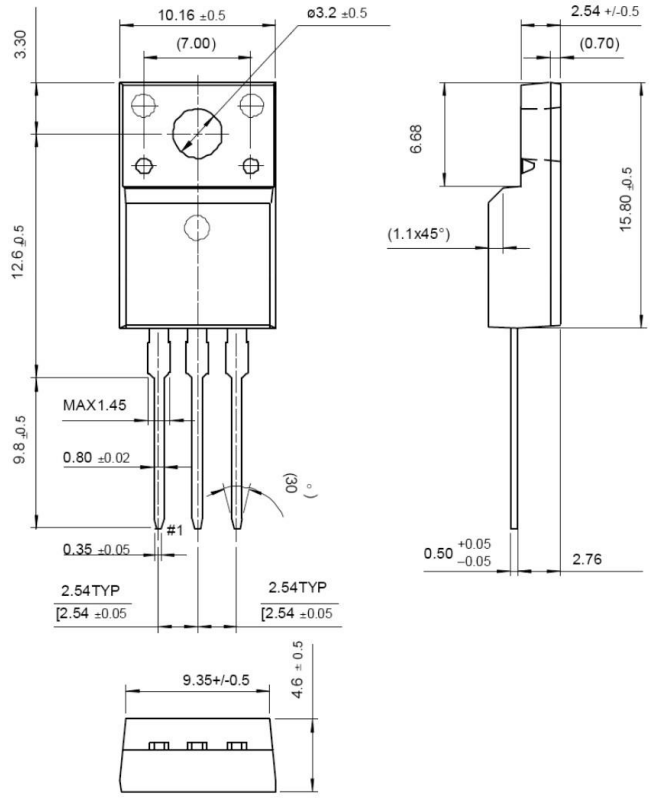
The MSF2N60 is a N-channel enhancement-mode MOSFET , providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220F package is universally preferred for all commercial-industrial applications

Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

Application

- Open Framed Power Supply
- Adapter
- STB

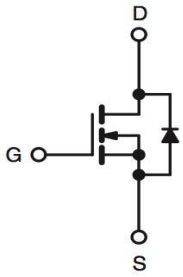


Packing & Order Information

50/Tube ; 1,000/Box

RoHS COMPLIANT

Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	600	V
V_{GS}	Gate-Source Voltage	±30	V
I_D	Drain Current -Continuous (TC=25°C)	2.0	A
	Drain Current -Continuous (TC=100°C)	1.3	A
I_{DM}	Drain Current Pulsed	8.0	A
E_{AS}	Single Pulsed Avalanche Energy	120	mJ
E_{AR}	Repetitive Avalanche Energy	5.4	mJ
dv/dt	Peak Diode Recovery dv/dt	4.5	V/ns
T_J,T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C

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Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
P_D	Total Power Dissipation (TC = 25 °C)	23	W
	Derating Factor above 25 °C	0.18	W/°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

• Drain current limited by maximum junction temperature

Thermal characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Max.	Units
Rthjc	Junction-to-Case	5.5	°C/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
V_{GS}	Gate Threshold Voltage	V_{DS} = V_{GS},I_D = 250μA	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V,I_D = 3.5 A	--	4.0	4.7	Ω

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V , I_D=250μA	600	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	--	0.6	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V , V_{GS} = 0 V V_{DS} = 480 V , T_C = 125°C	--	--	10 100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V , V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V , V_{DS} = 0 V	--	--	-100	nA

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f= 1.0MHz	--	320	420	pF
C_{OSS}	Output Capacitance		--	35	46	pF
C_{RSS}	Reverse Transfer Capacitance		--	4.5	6.0	pF
Q_g	Total Gate Charge	V_{DS} = 480 V,I_D = 2 A, V_{GS} = 10 V	--	9.5	13	
Q_{gs}	Gate-Source Charge		--	1.6	--	
Q_{gd}	Gate-Drain Charge		--	4.0	--	

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Dynamic Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ.**	**Max.**	**Units**
$t_{d(on)}$	Turn-On Time	V_{DS} = 300 V, I_D = 2 A, R_G = 25 Ω	--	8	30	ns
t_r	Turn-On Time		--	23	60	ns
$t_{d(off)}$	Turn-Off Delay Time		--	25	60	ns
tf	Turn-Off Fall Time		--	28	70	ns

Source-Drain Diode Maximum Ratings and Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ.**	**Max.**	**Units**
I_S	Continuous Source-Drain Diode Forward Current		--	--	2.0	A
I_{SM}	ISM Pulsed Source-Drain Diode Forward Current		--	--	6.0	
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 2 A , V_{GS} = 0 V	--	--	1.4	V
t_{rr}	Reverse Recovery Time	I_S = 2 A , V_{GS} = 0 V diF/dt=100A/μs	--	230	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.0	--	μC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=55mH, I_{AS}=2A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃
3. I_{SD}≦2A, di/dt≦200A/μs,V_{DD}≦BV_{DSS}, Starting T_J=25℃
4. Pulse Test: Pulse Width ≦ 300μs, Duty Cycle≦ 2%
5. Essentially Independent of Operating Temperature

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■Characteristics Curve

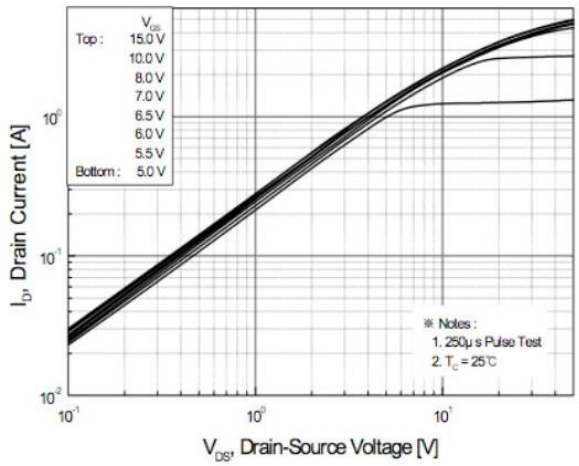

FIG.1-ON REGION CHARACTERISTICS

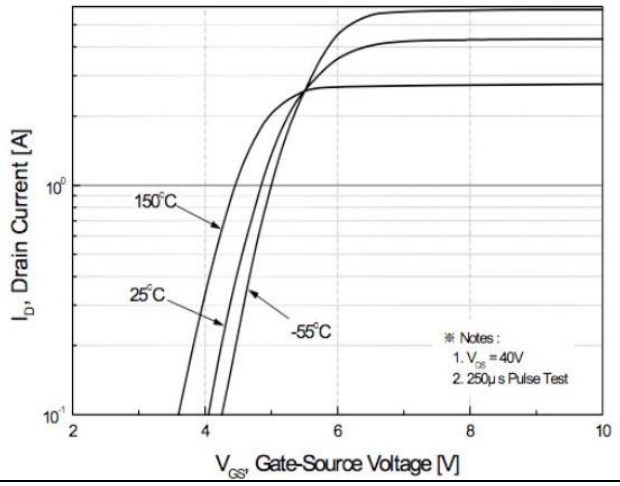

FIG.2-TRANSFER CHARACTERISTICS

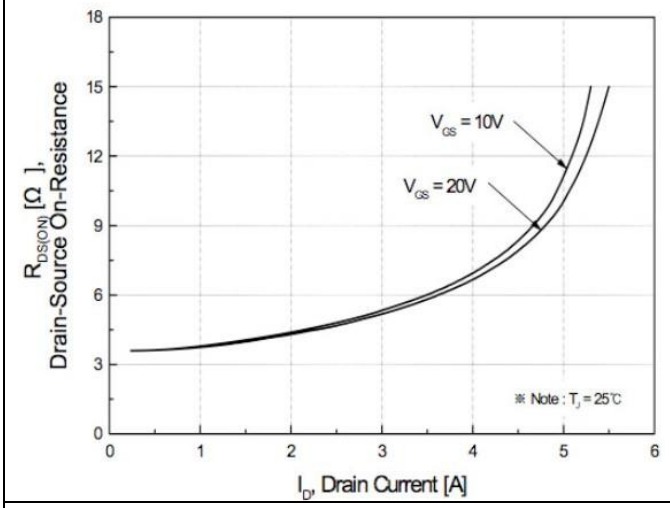

FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

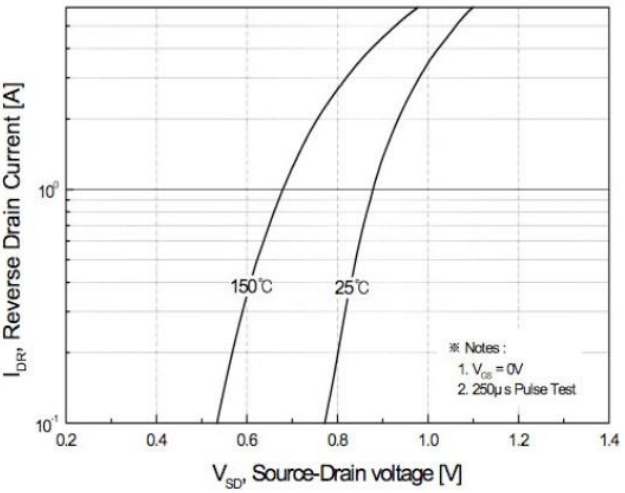

FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

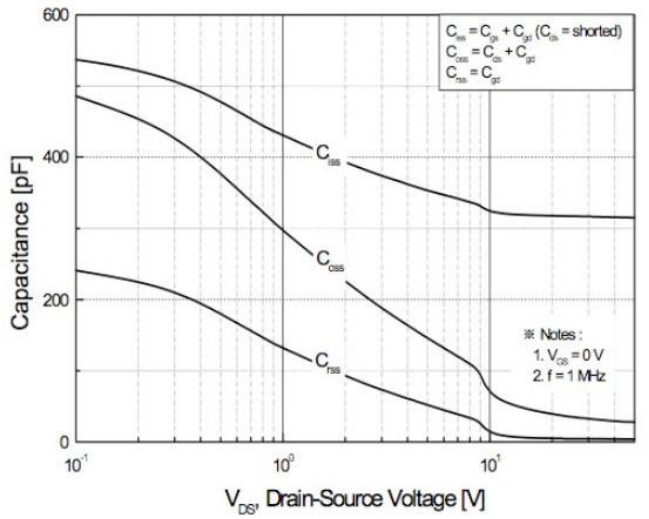

FIG.5-CAPACITANCE CHARACTERISTICS

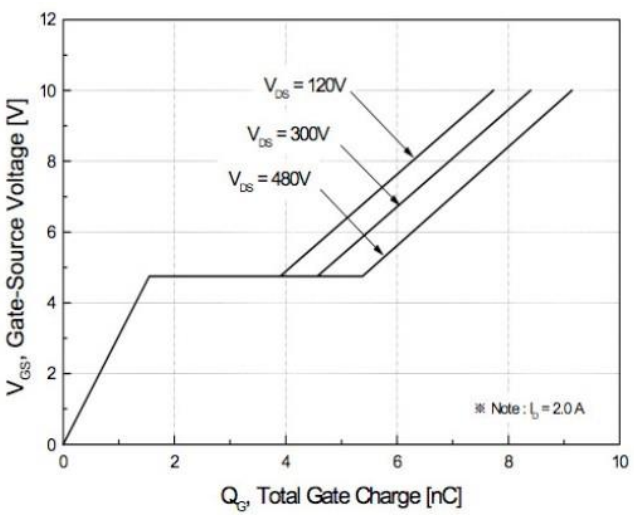

FIG.6-GATE CHARGE CHARACTERISTICS

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■Characteristics Curve

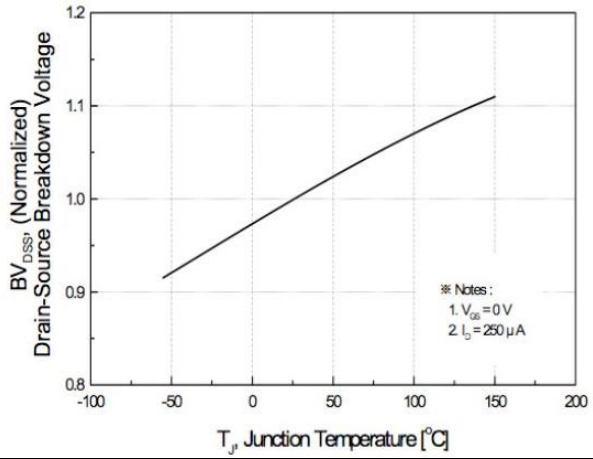

FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

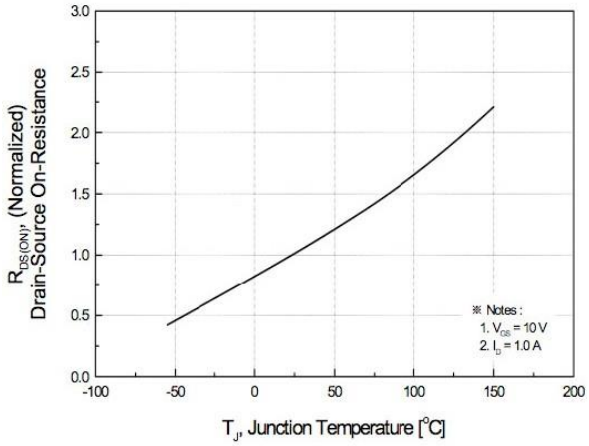

FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

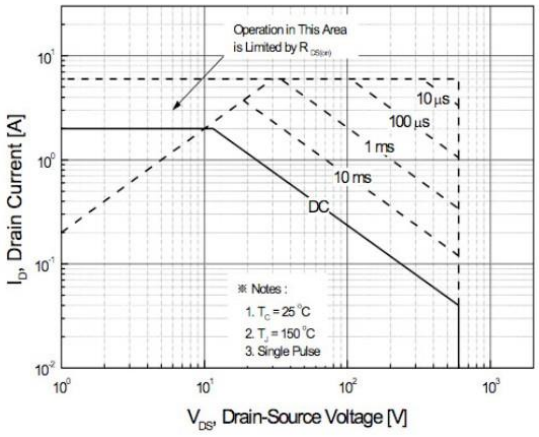

FIG.9-MAXIMUM SAFE OPERATING AREA

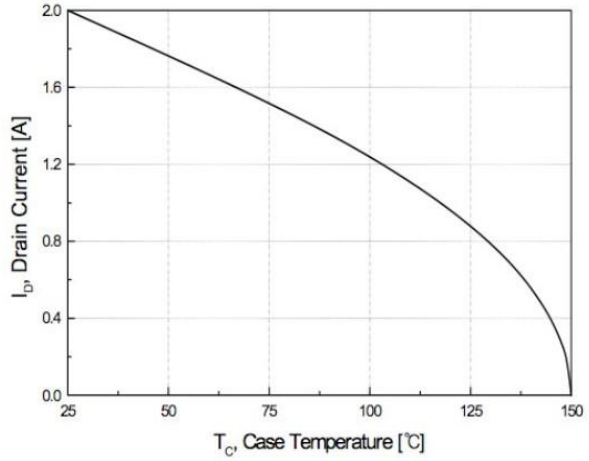

FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

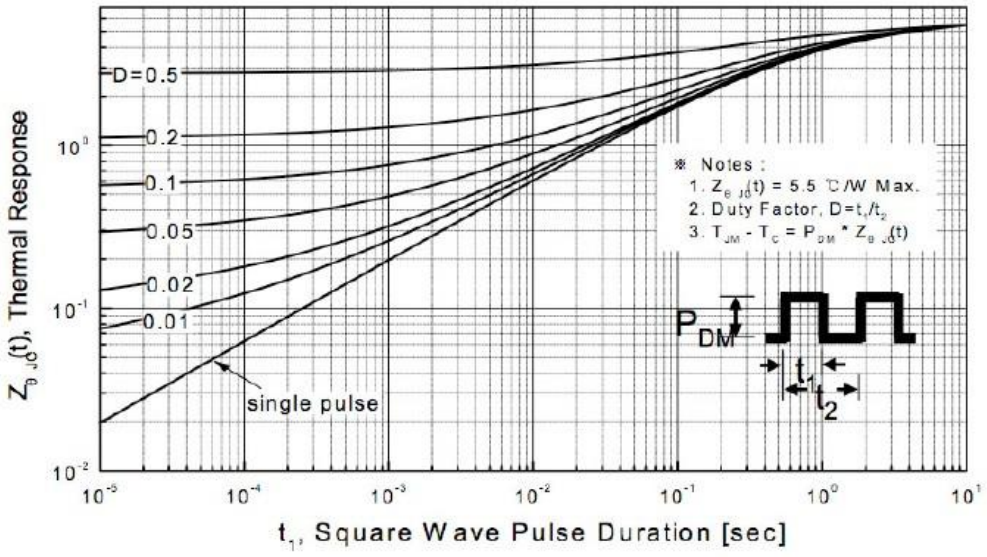

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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■Characteristics Test Circuit & Waveform

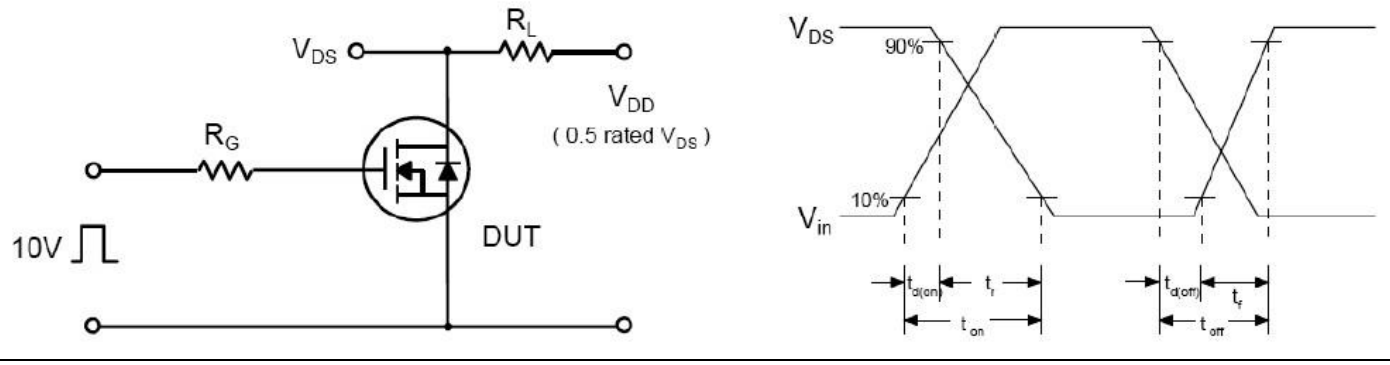

Fig 12. Resistive Switching Test Circuit & Waveforms

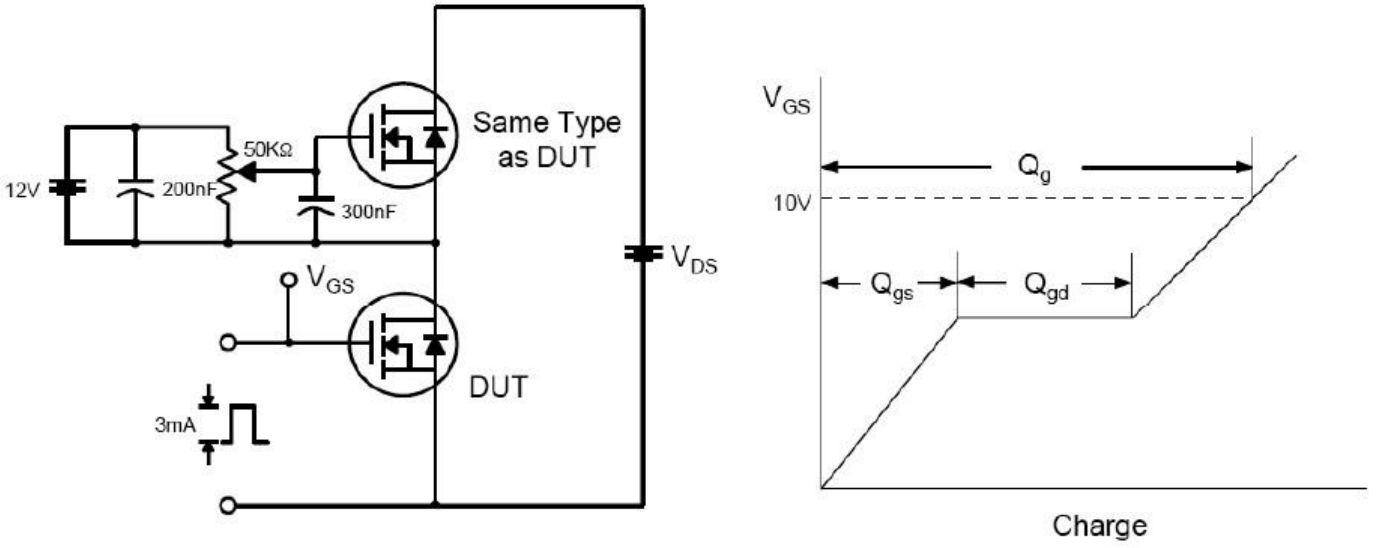

Fig 13. Gate Charge Test Circuit & Waveform

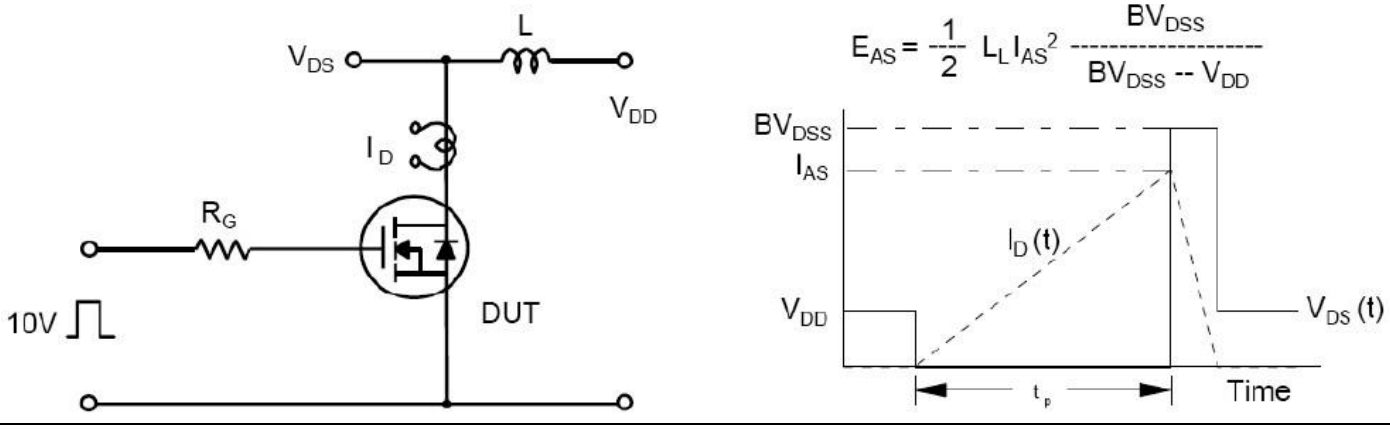

Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

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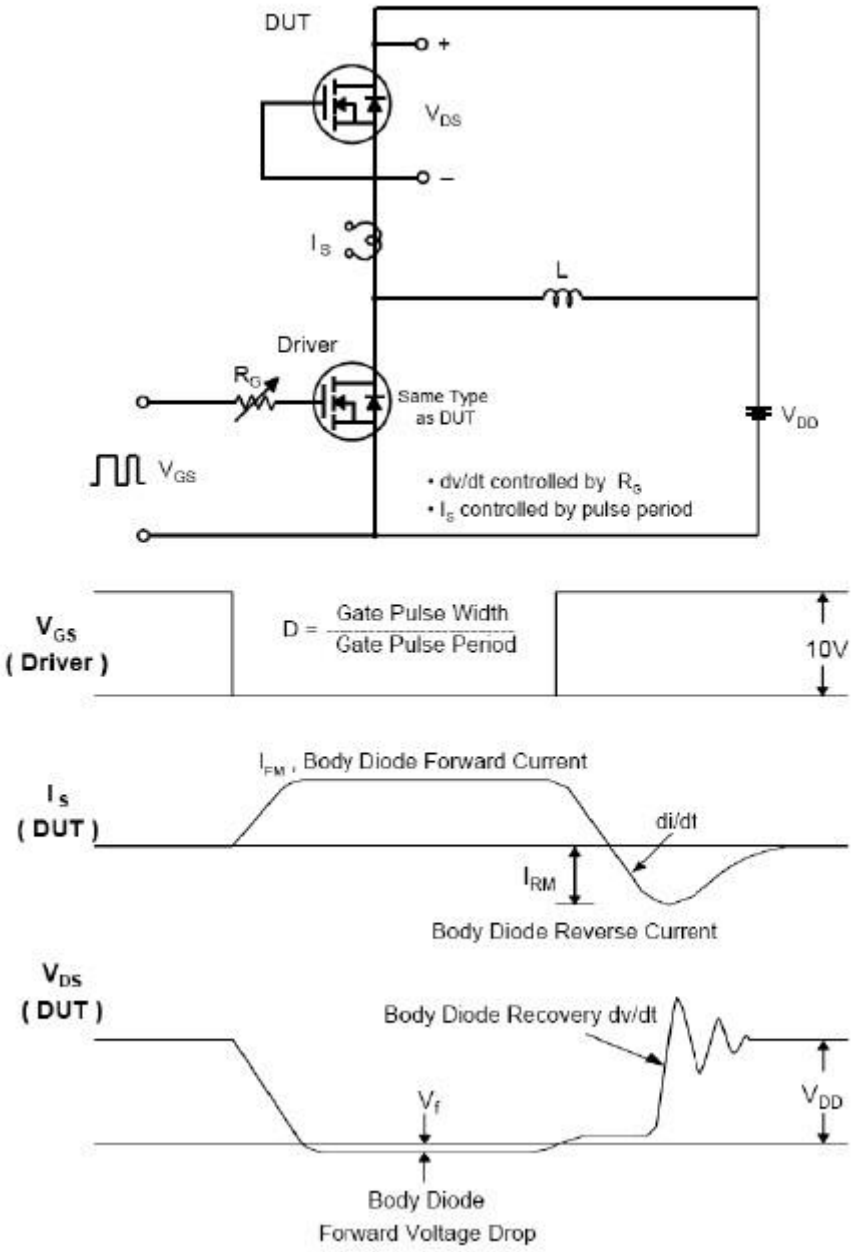

Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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