MSF12N60

600V N-Channel MOSFET

Description

The MSF12N60 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

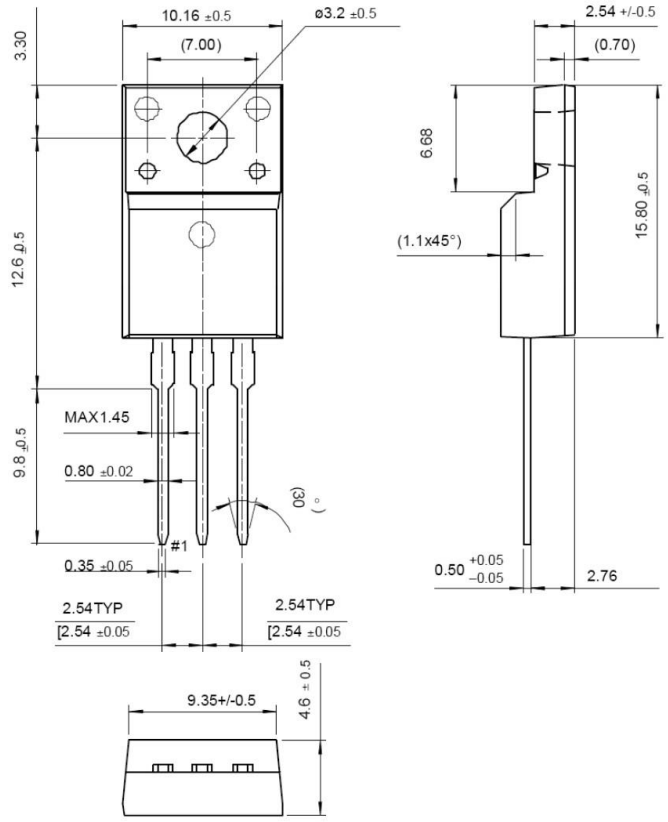
Application

- Power Factor Correction
- LCD TV Power
- Full and Half Bridge Power

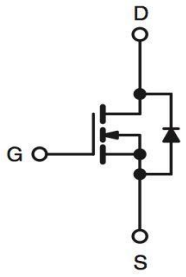
Packing & Order Information

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	600	V
V_{GS}	Gate-Source Voltage	±30	V
I_D	Drain Current -Continuous (TC=25°C)	12	A
	Drain Current -Continuous (TC=100°C)	7.5	A
I_{DM}	Drain Current Pulsed	48	A
E_{AS}	Single Pulsed Avalanche Energy	870	mJ
I_{AR}	Avalanche Current	12	A
E_{AR}	Repetitive Avalanche Energy	22.5	mJ
dV/dt	Peak Diode Recovery dV/dt	3.5	V/ns

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

Symbol	Parameter	Value	Unit
P_D	Power Dissipation (TC = 25 °C)	54	W
	Power Dissipation (TC=100°C)	0.43	W/°C
T_J,T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C

NOTE:

1. TJ=+25°C to +150°C.

2. Repetitive rating; pulse width limited by maximum junction temperature.3. ISD=12A, dI/dt<100A/μs, VDD<BVDSS, TJ=+150°C.

4. IAS=12A, VDD=50V, L=11mH, RG=25Ω, starting TJ=+25˚C.

Off 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}=10V,I_D=6A	--	0.58	0.65	Ω
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	--	0.5	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V , V_{GS}= 0 V V_{DS}=480V , T_C= 125°C	--	--	1 10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS}=30V , V_{DS}=0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS}=-30V , V_{DS}=0 V	--	--	-100	nA

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	--	1760	2290	pF
C_{OSS}	Output Capacitance		--	182	235	pF
C_{RSS}	Reverse Transfer Capacitance		--	21	28	pF

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Time	V_{DS}=250 V, I_D=12A, R_G=10Ω	--	30	70	ns
t_r	Turn-On Time		--	85	180	ns
$t_{d(off)}$	Turn-Off Delay Time		--	140	280	ns
tf	Turn-Off Fall Time		--	90	190	ns
Q_g	Total Gate Charge	V_{DS}=480V,I_D=12A, V_{GS}=10 V	--	48	63	nC
Q_{gs}	Gate-Source Charge		--	8.5	--	nC
Q_{gd}	Gate-Drain Charge		--	21	--	nC

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Source-Drain Diode Maximum Ratings and Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ.**	**Max.**	**Units**
I_S	Continuous Source-Drain Diode Forward Current		--	--	12	A
I_{SM}	ISM Pulsed Source-Drain Diode Forward Current		--	--	48	
V_{SD}	Source-Drain Diode Forward Voltage	I_S=12A , V_{GS}= 0V	--	--	1.5	V
t_{rr}	Reverse Recovery Time	I_S=12A , V_{GS}= 0V diF/dt=100A/μs	--	460	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.9	--	μC

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■Characteristics Curve

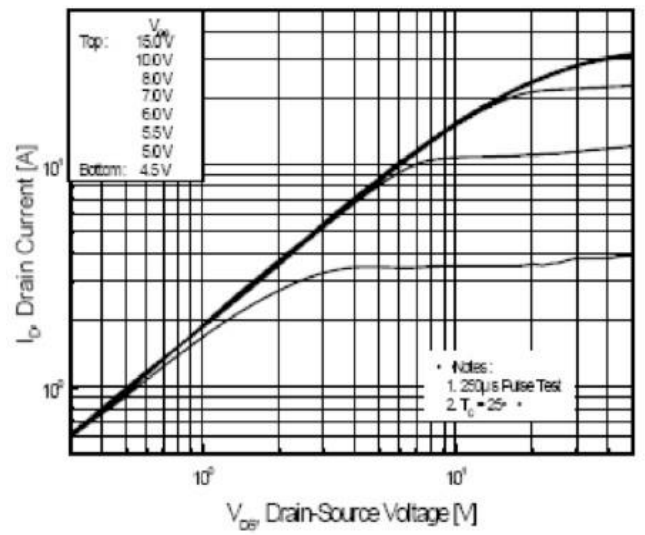

FIG.1-ON REGION CHARACTERISTICS

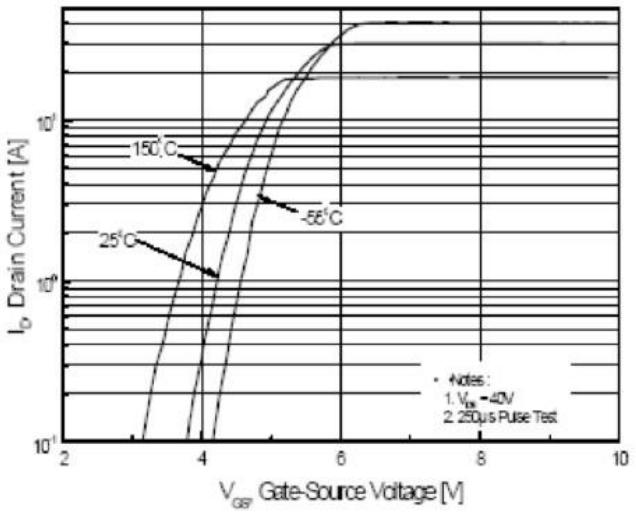

FIG.2-TRANSFER CHARACTERISTICS

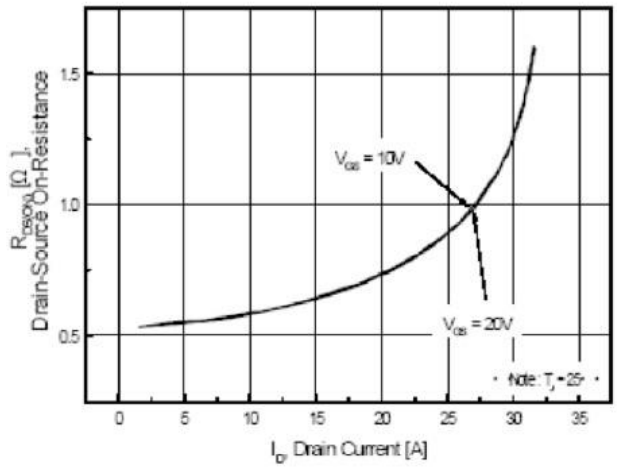

FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

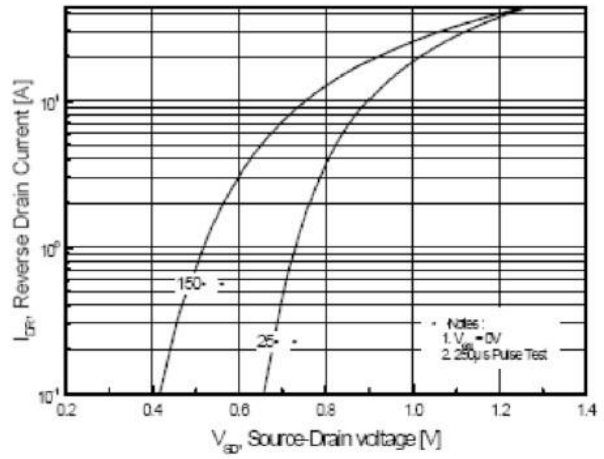

FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

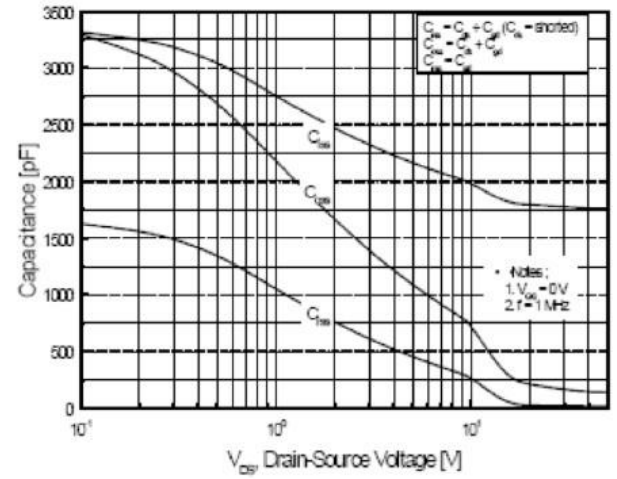

FIG.5-CAPACITANCE CHARACTERISTICS

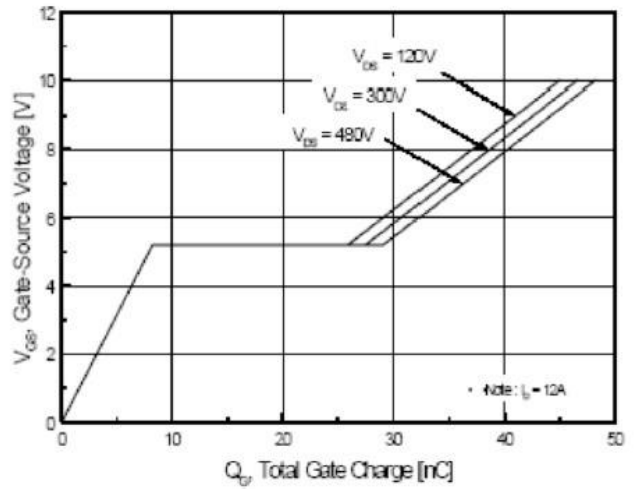

FIG.6-GATE CHARGE CHARACTERISTICS

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■Characteristics Curve

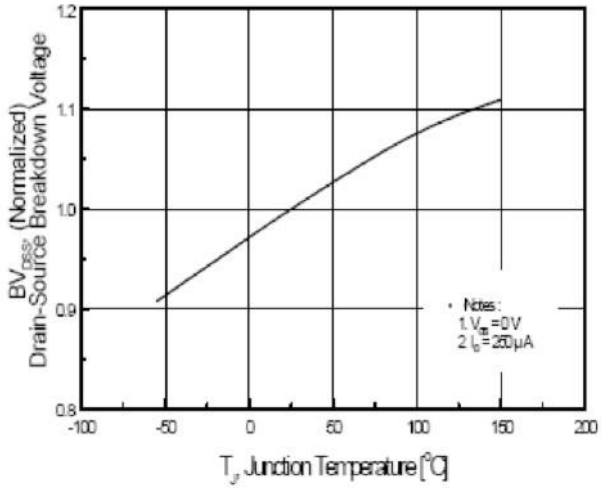

FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

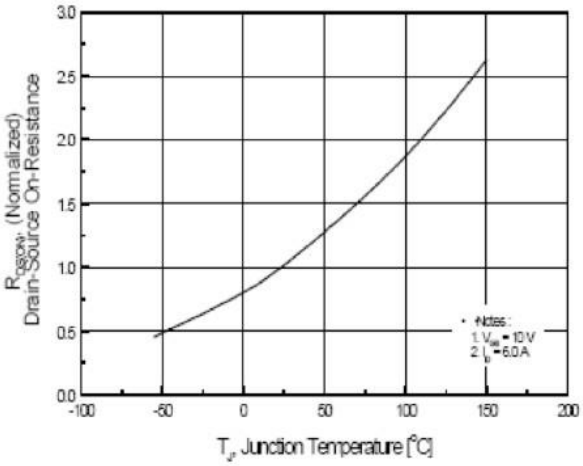

FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

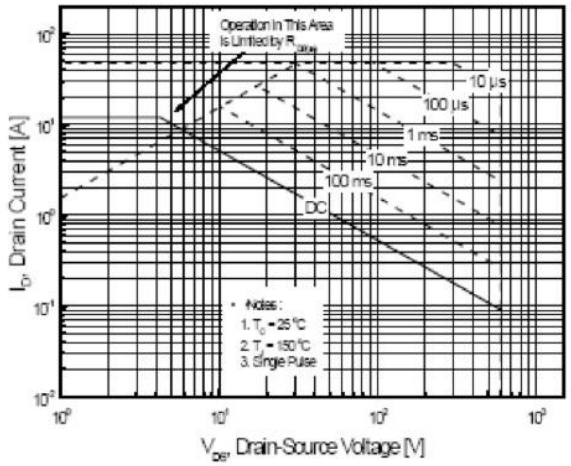

FIG.9-MAXIMUM SAFE OPERATING AREA

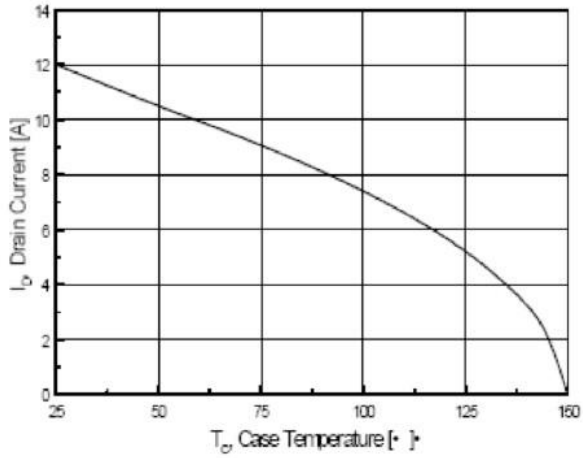

FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

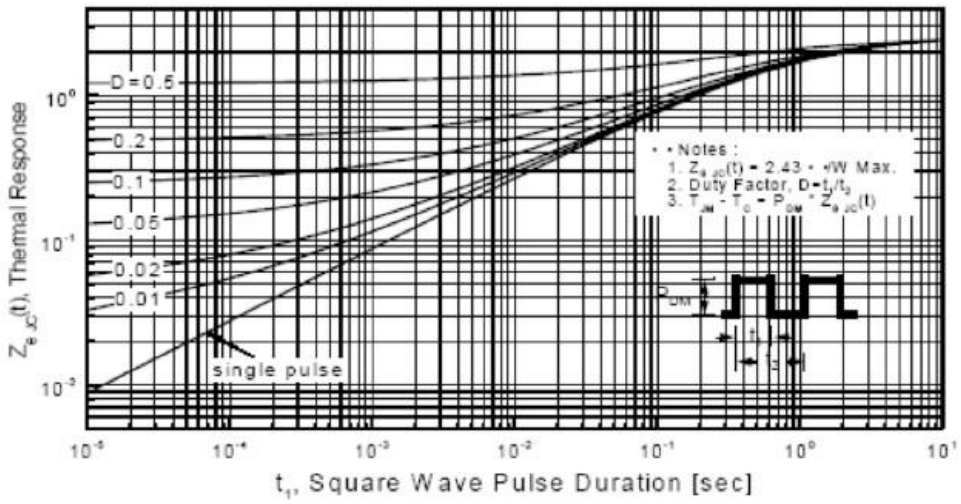

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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■Characteristics Test Circuit & Waveform

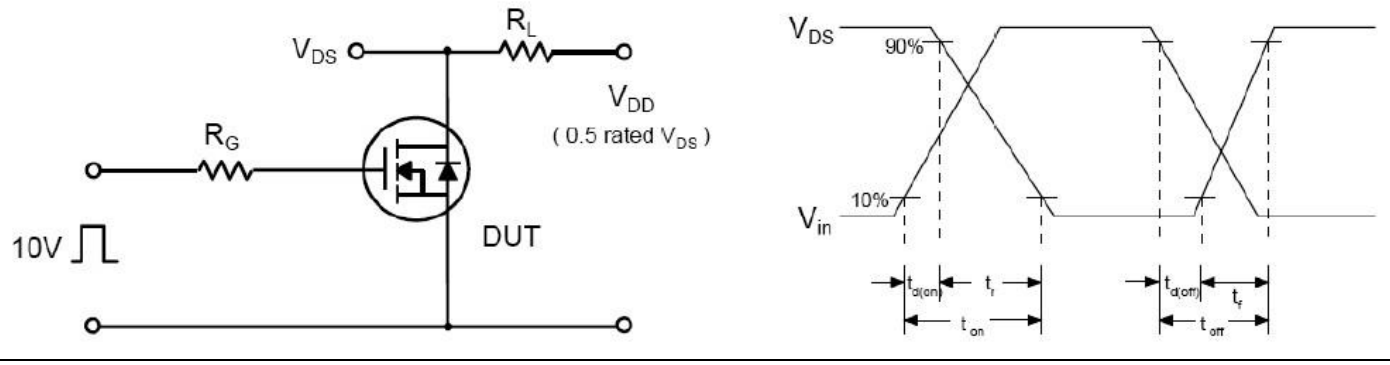

Fig 12. Resistive Switching Test Circuit & Waveforms

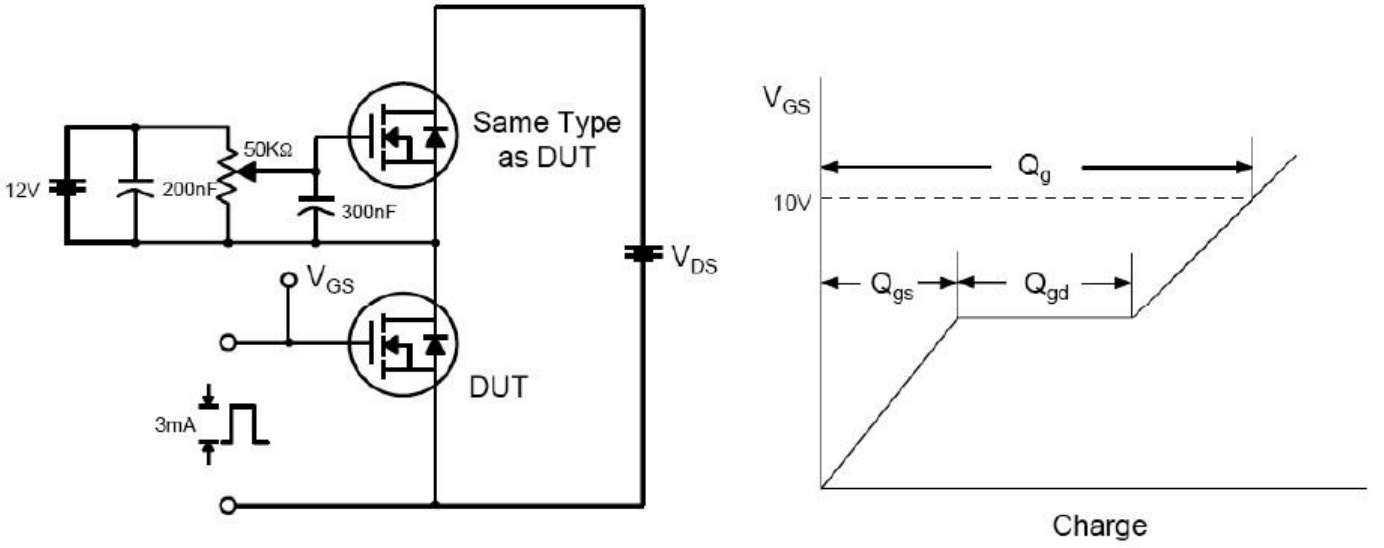

Fig 13. Gate Charge Test Circuit & Waveform

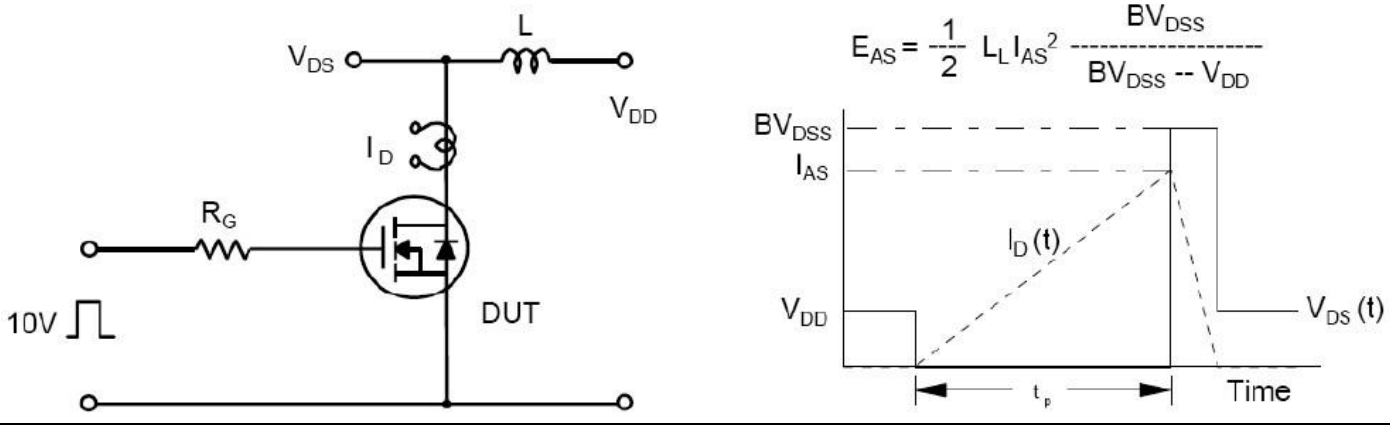

Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

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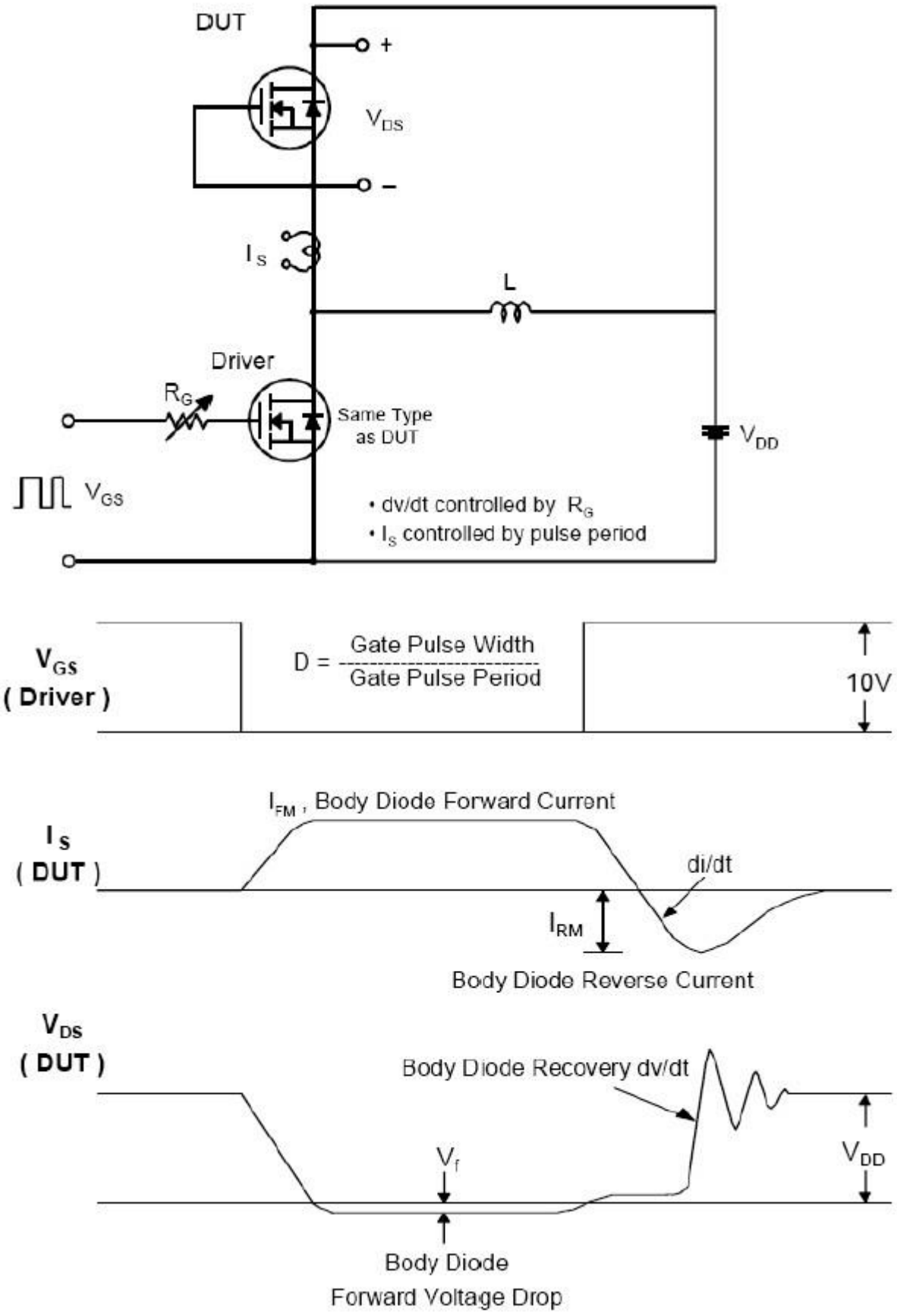

Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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