MS13N50

500V N-Channel MOSFET

Description

The MS13N50 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-220 package is universally preferred for all commercial-industrial applications

Features

- Originative New Design
- Very Low Intrinsic Capacitances
- Excellent Switching Characteristics
- 100% EAS Test
- Extended Safe Operating Area
- RoHS compliant package

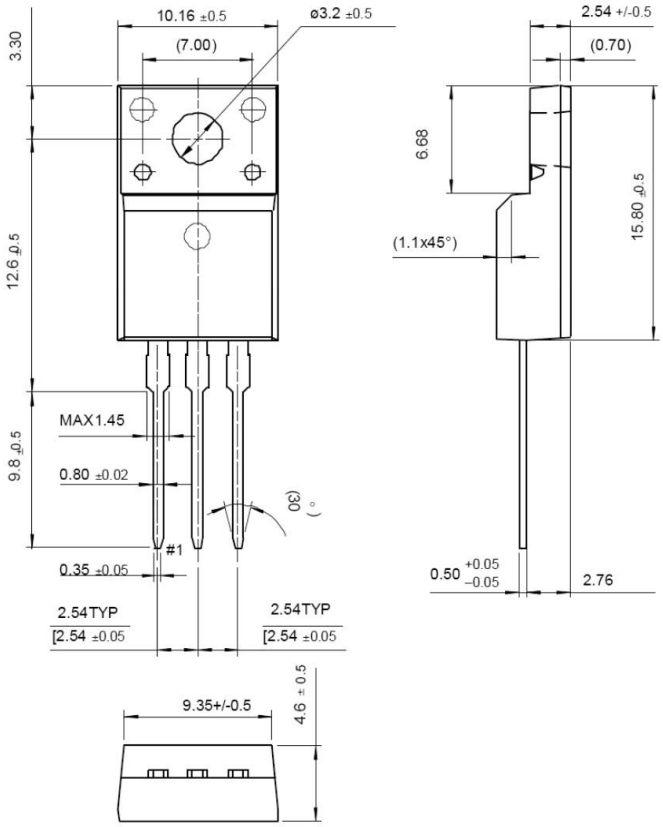
Application

- Electronic lamp ballasts
- based on half bridge topology
- PFC (Power Factor Correction)
- SMPS (Switched Mode Power Supplies)

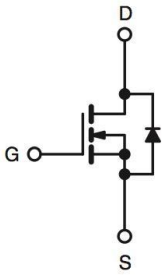
Packing & Order Information

50/Tube ; 1,000/Box

RoHS COMPLIANT



Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

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)	13	A
	Drain Current -Continuous (TC=100°C)	8	A
I_{DM}	Drain Current –Pulsed	52	A
E_{AS}	Avalanche Energy	803	mJ
E_{AR}	Repetitive Avalanche Energy	19.5	mJ
P_D	Power Dissipation (TC=25°C)	195	W
	Power Dissipation (TC=100°C)	1.56	W/°C

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

Symbol	Parameter	Value	Unit
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +175	°C

Note:

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

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
Rthjc	Typical thermal resistance	--	0.64	°C/W
$R_{\theta JA}$		--	62.5	

Static Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	V_{GS} = 0 V , I_D = 250μA	500	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	I_D = 250μA, Referenced to 25°C	--	0.50	--	V/°C
V_{GS}	V_{DS} = V_{GS}, I_D = 250μA	2.0		4.0	V
G_{FS}	V_{DS} = 40 V, I_D = 6.5A			15	S
I_{DSS}	V_{DS} = 500 V , V_{GS} = 0 V V_{DS} = 400 V , V_{GS} = 0 V , T_j= 125°C	--	--	1 10	uA
I_{GSS}	V_{GS} = ±30	--	--	±100	nA
*$R_{DS(ON)}$	V_{GS} = -10 V , I_D = 6.5 A	--	3.8	4.8	Ω

Dynamic Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
Q_g	V_{DS} = 400 V,I_D = 13 A, V_{GS} = 10 V	--	43	56	nC
Q_{gs}		--	7.5	10	nC
Q_{gd}		--	18.5	24	nC
$t_{d(on)}$	V_{DS} = 250 V, I_D = 13 A, R_G = 25 Ω	--	25	57.5	ns
t_r		--	100	220	ns
$t_{d(off)}$		--	130	273	ns
tf		--	100	220	ns
C_{ISS}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0MHz	--	1580	2054	pF
C_{OSS}		--	180	234	pF
C_{RSS}		--	20	28	pF

Source-Drain Diode Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
I_S		--	--	13	A
I_{SM}		--	--	52	

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V_{SD}	IF = IS, V_{GS} = 0	--	--	1.4	V
t_{rr}	IF = IS, dIF/dt=100A/μs	--	410	--	ns
Q_{rr}		--	4.5	--	uC

Notes:

1. Repeativity rating : pulse width limited by junction temperature
2. L=9.5mH,IAS=13A,VDD=50V,RG=25Ω,Starting TJ=25°˚C
3. ISD ≤ 13A, di/dt ≤ 200A/μs, VDD ≤ BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse Width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially independent of operating temperature.

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■Characteristics Curve

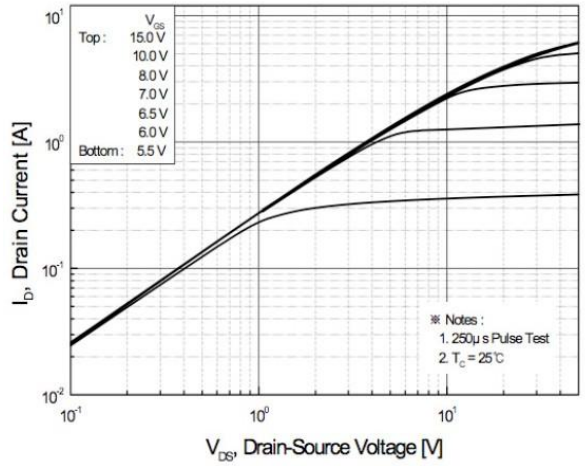

FIG.1-ON REGION CHARACTERISTICS

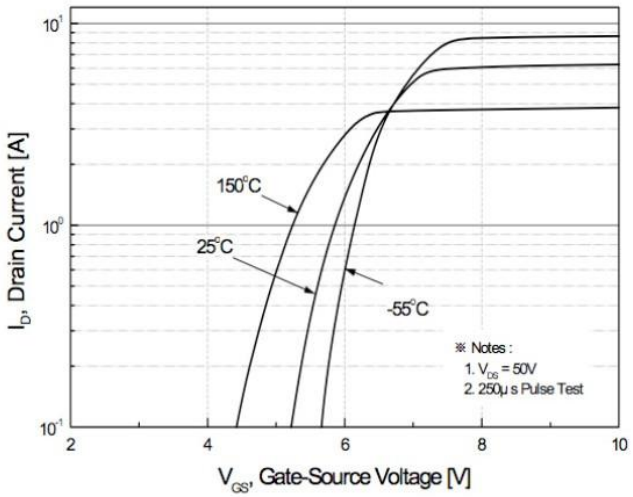

FIG.2-TRANSFER CHARACTERISTICS

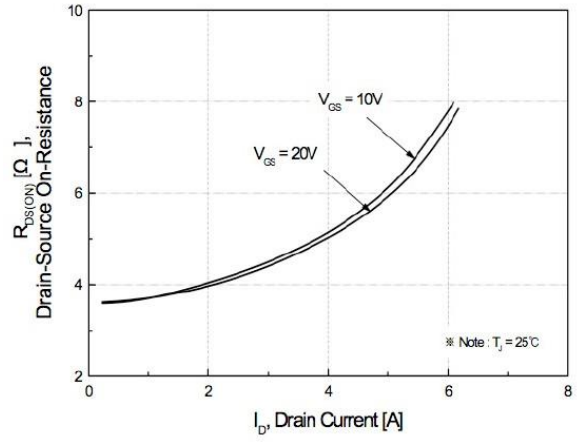

FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

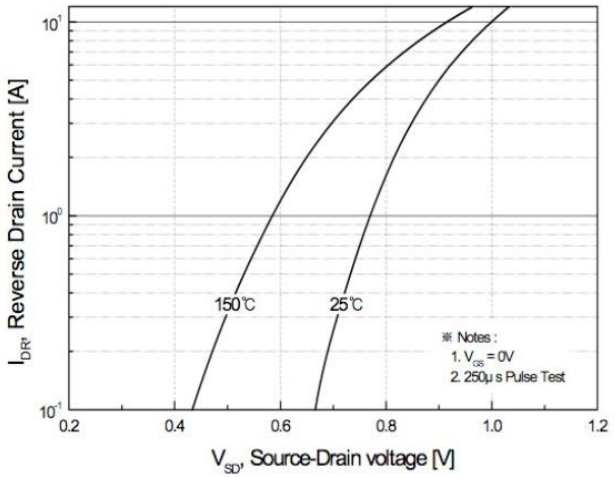

FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

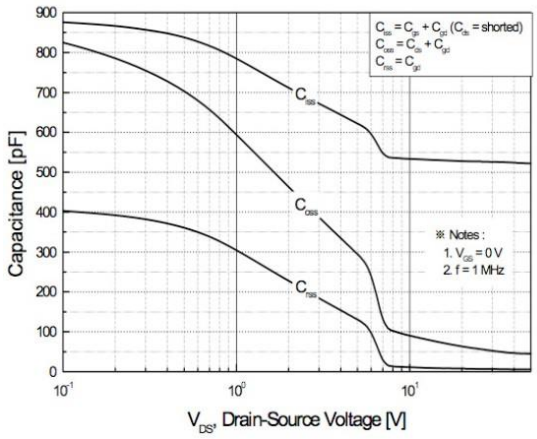

FIG.5-CAPACITANCE CHARACTERISTICS

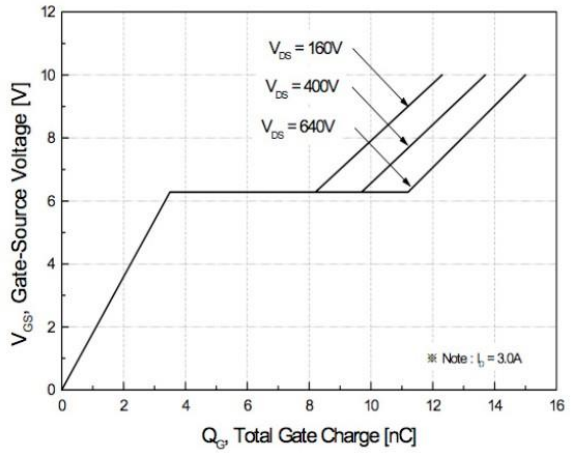

FIG.6-GATE CHARGE CHARACTERISTICS

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■Characteristics Curve

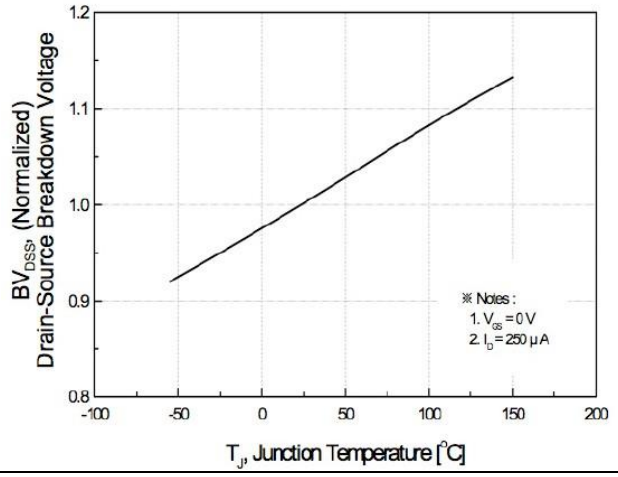

FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

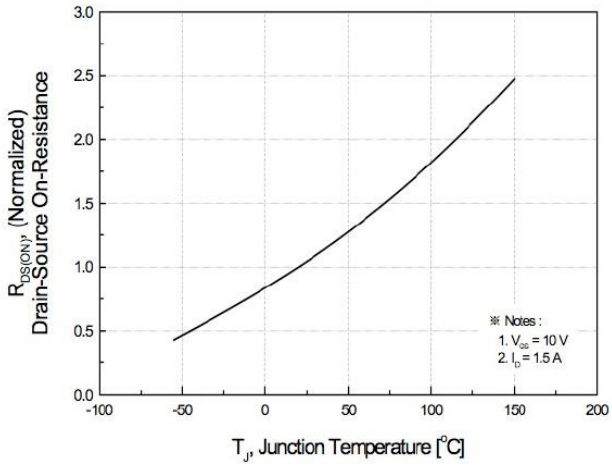

FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

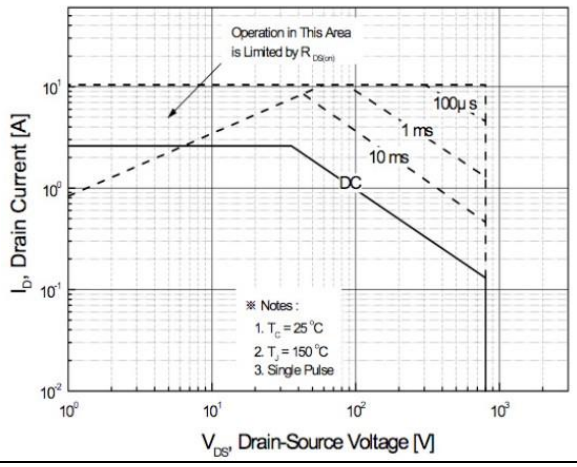

FIG.9-MAXIMUM SAFE OPERATING AREA

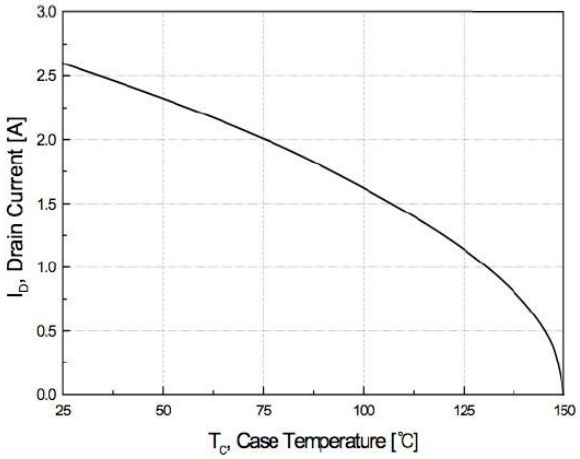

FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

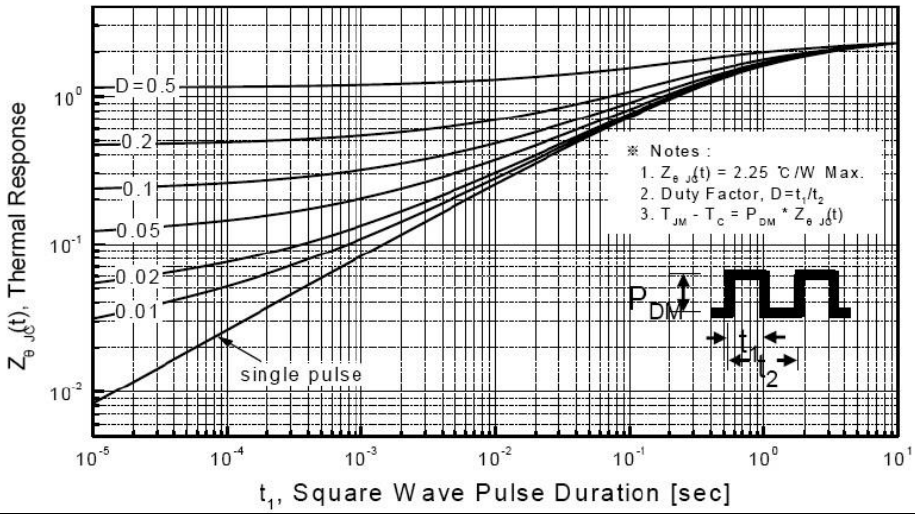

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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■Characteristics Test Circuit & Waveform

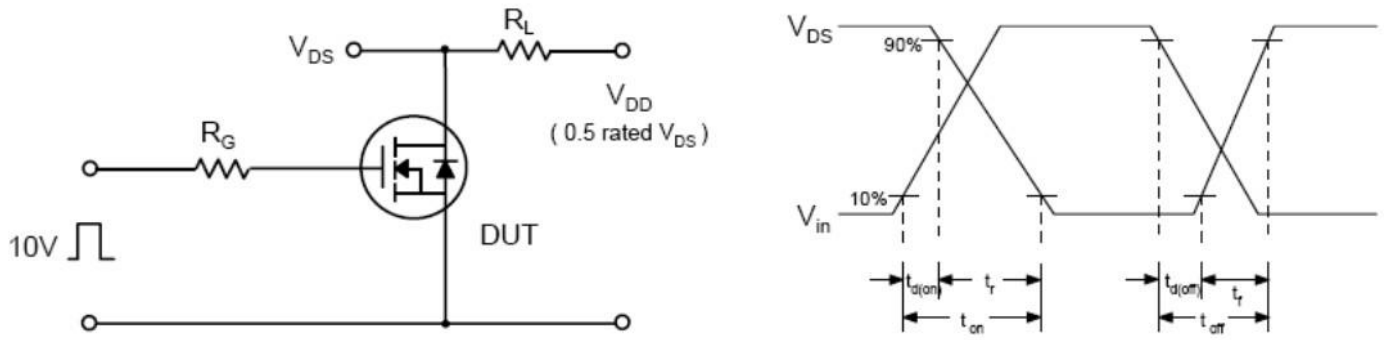

FIG.12-RESISTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

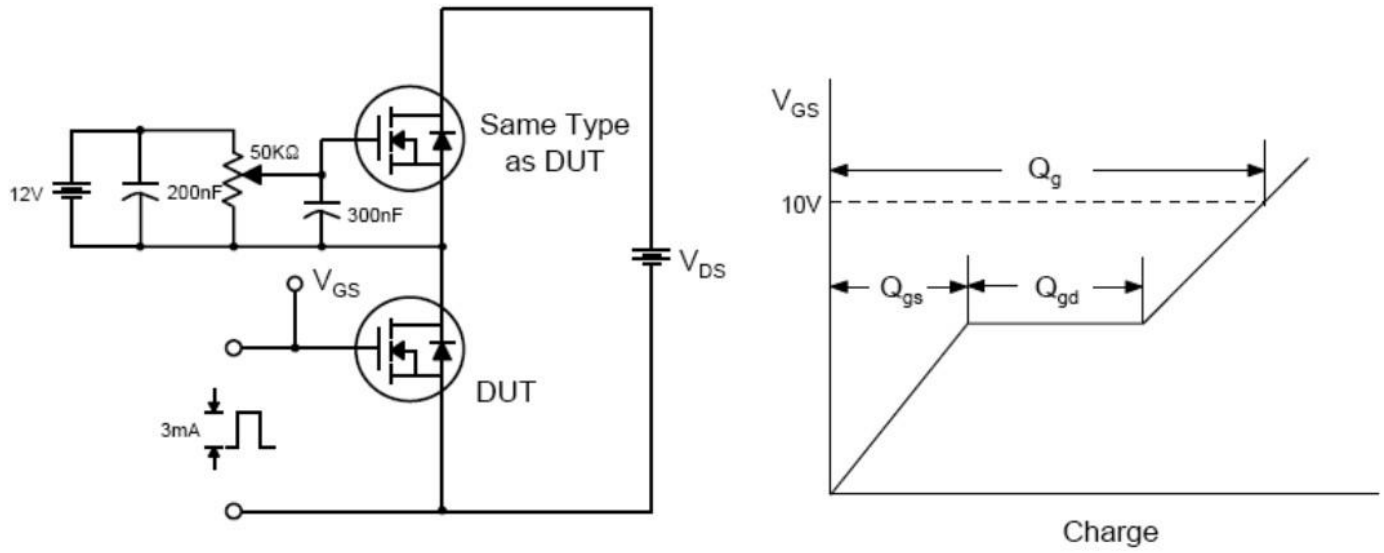

FIG.13-GATE CHARGE TEST CIRCUIT & WAVEFORM

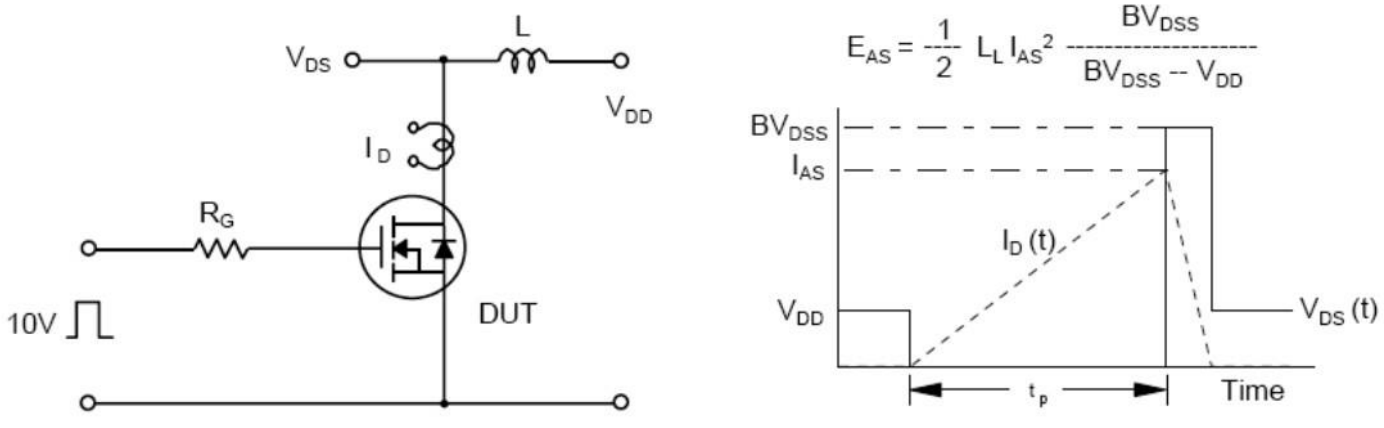

FIG.14-UNCLAMPED LINDUCTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

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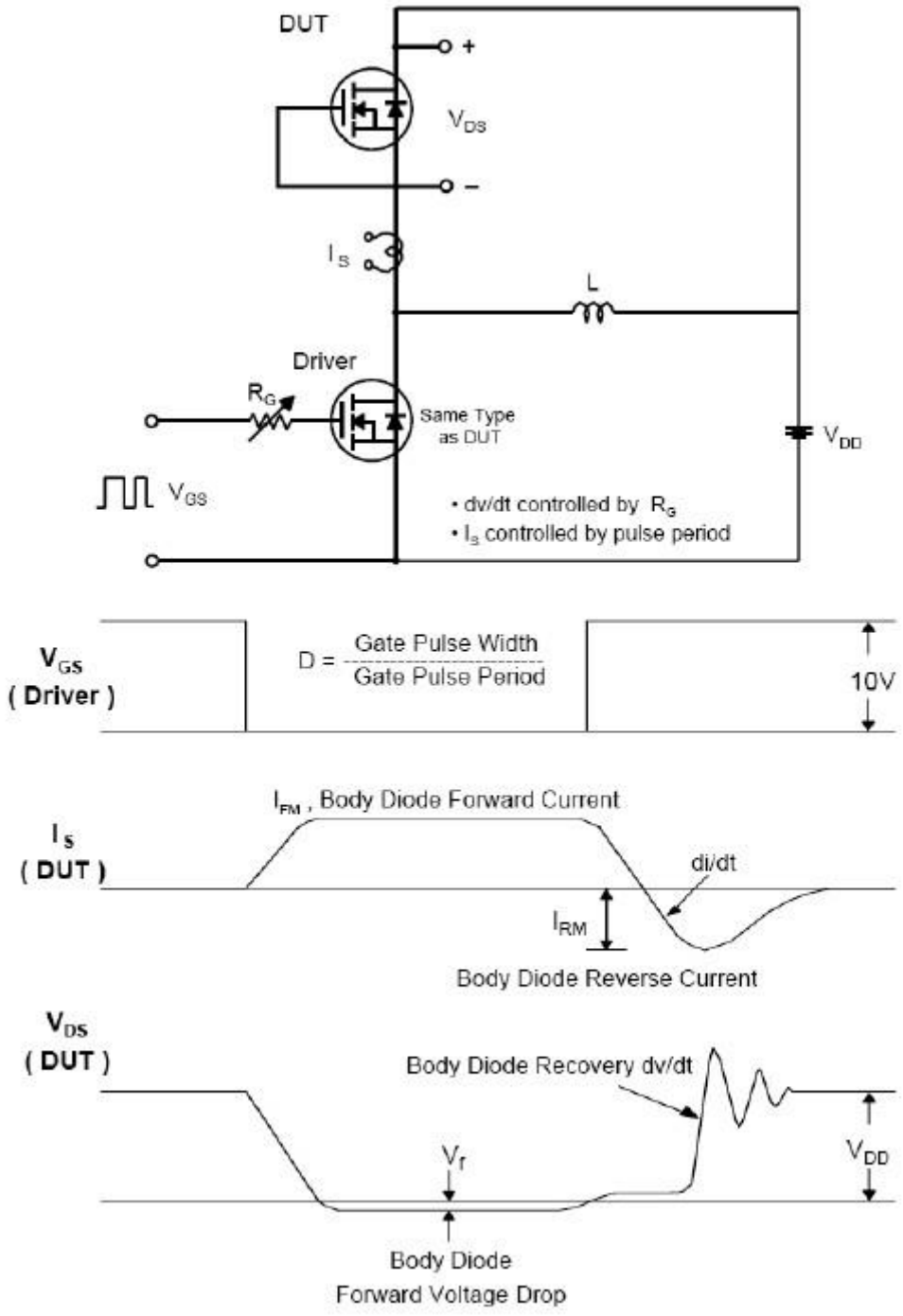

Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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