

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

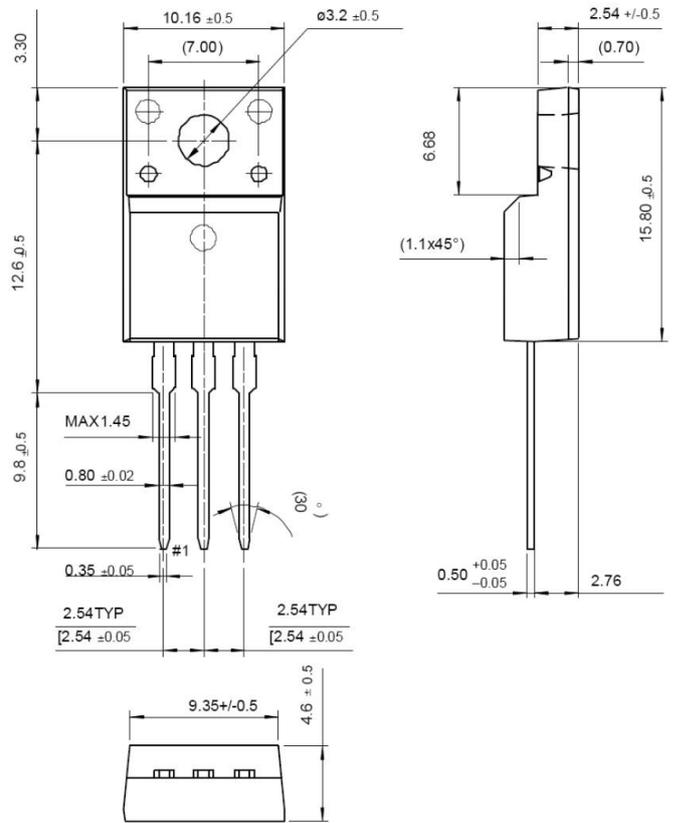
- Electronic lamp ballasts
- based on half bridge topology
- PFC (Power Factor Correction)
- SMPS (Switched Mode Power Supplies)

Packing & Order Information

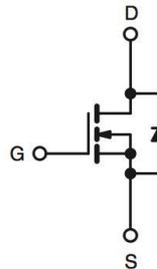
50/Tube ; 1,000/Box



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

MS13N50

500V N-Channel MOSFET

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 $\leq 1\%$

Thermal Resistance Characteristics

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

Static Characteristics

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

Dynamic Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
Q_g	$V_{DS} = 400\text{ V}$, $I_D = 13\text{ A}$, $V_{GS} = 10\text{ V}$	--	43	56	nC
Q_{gs}		--	7.5	10	nC
Q_{gd}		--	18.5	24	nC
$t_{d(on)}$	$V_{DS} = 250\text{ V}$, $I_D = 13\text{ A}$, $R_G = 25\ \Omega$	--	25	57.5	ns
t_r		--	100	220	ns
$t_{d(off)}$		--	130	273	ns
t_f		--	100	220	ns
C_{ISS}	$V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$	--	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	

MS13N50

500V N-Channel MOSFET

V_{SD}	$I_F = I_S, V_{GS} = 0$	--	--	1.4	V
t_{rr}	$I_F = I_S, diF/dt=100A/\mu s$	--	410	--	ns
Q_{rr}		--	4.5	--	μC

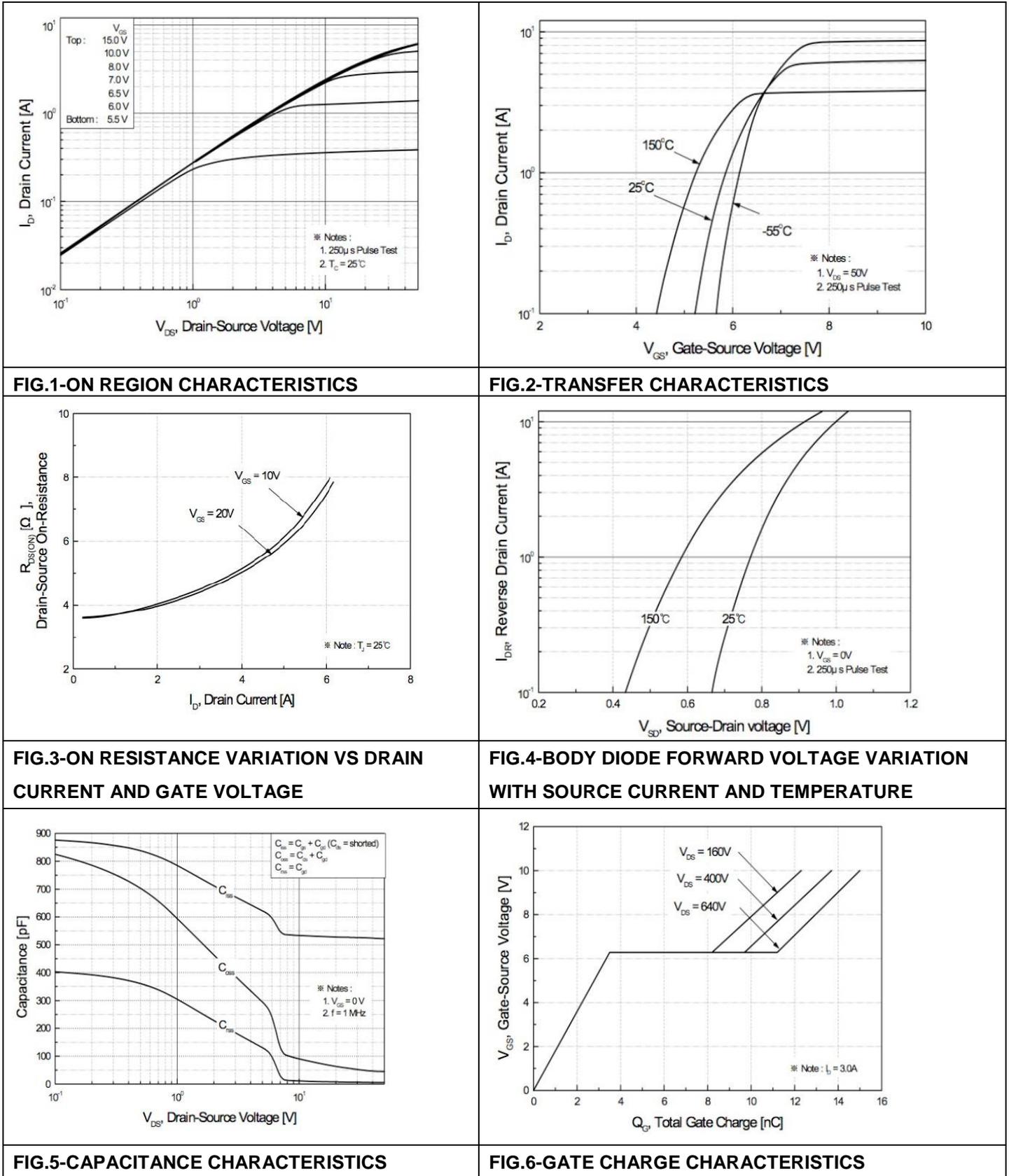
Notes:

1. Repeativity rating : pulse width limited by junction temperature
2. $L=9.5mH, I_{AS}=13A, V_{DD}=50V, R_G=25\Omega, \text{Starting } T_J=25^\circ C$
3. $I_{SD} \leq 13A, di/dt \leq 200A/\mu s, V_{DD} \leq BVDSS, \text{Starting } T_J = 25^\circ C$
4. Pulse Test : Pulse Width $\leq 300\mu s, \text{Duty Cycle} \leq 2\%$
5. Essentially independent of operating temperature.

MS13N50

500V N-Channel MOSFET

Characteristics Curve



MS13N50

500V N-Channel MOSFET

■ Characteristics Curve

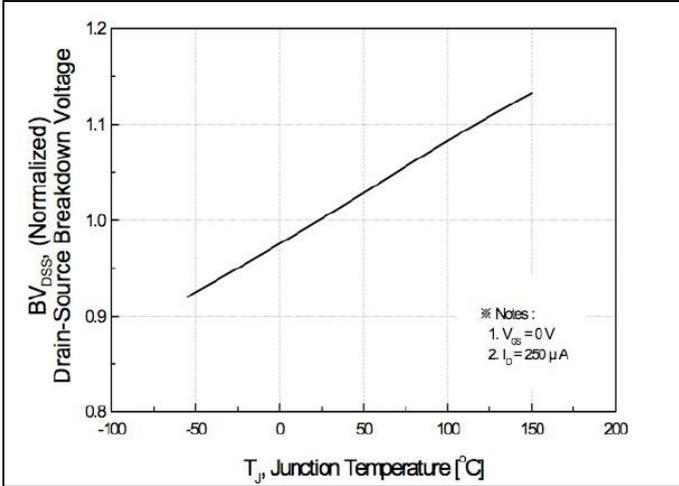


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

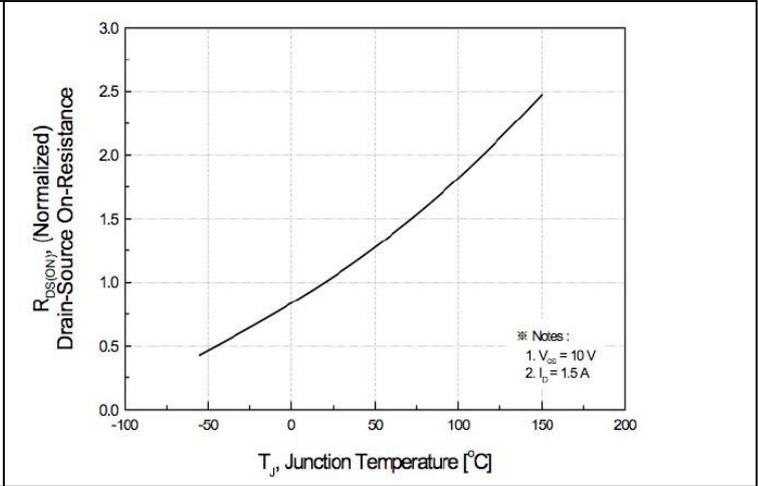


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

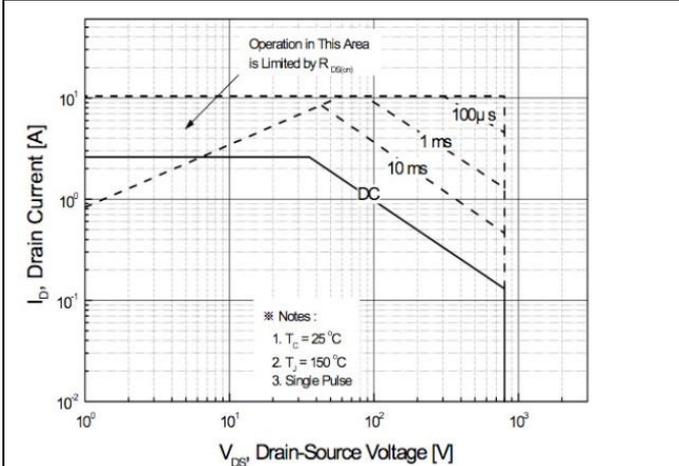


FIG.9-MAXIMUM SAFE OPERATING AREA

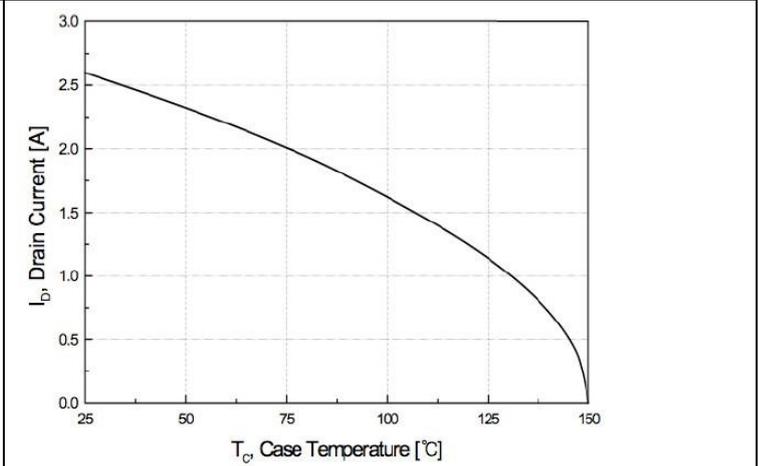


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

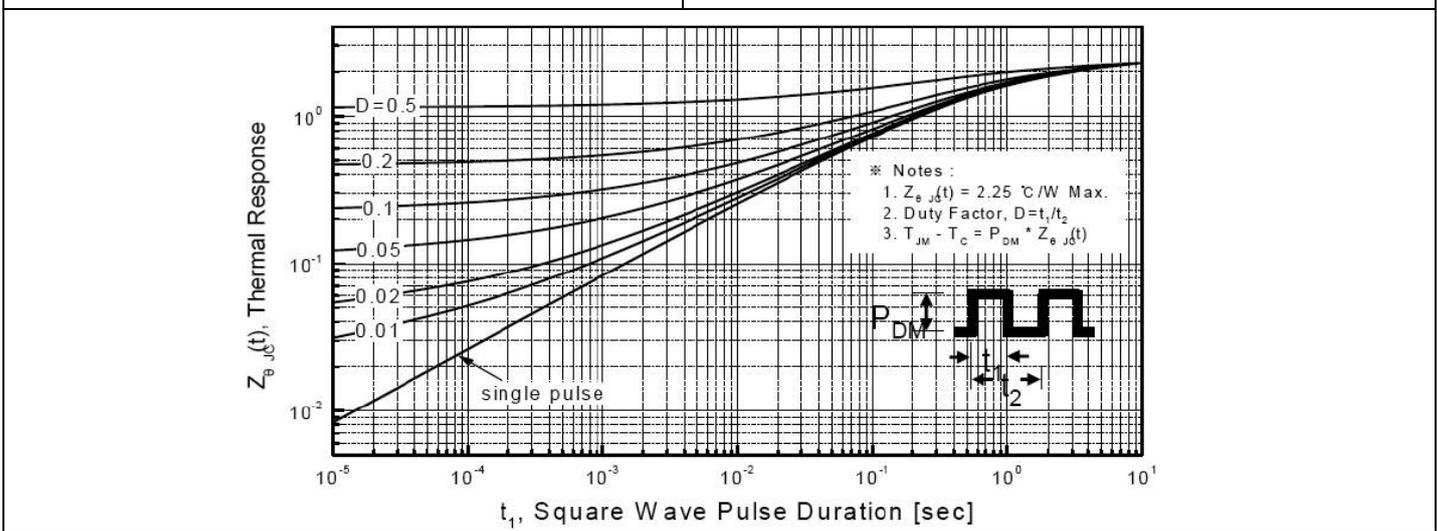


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

MS13N50

500V N-Channel MOSFET

■ Characteristics Test Circuit & Waveform

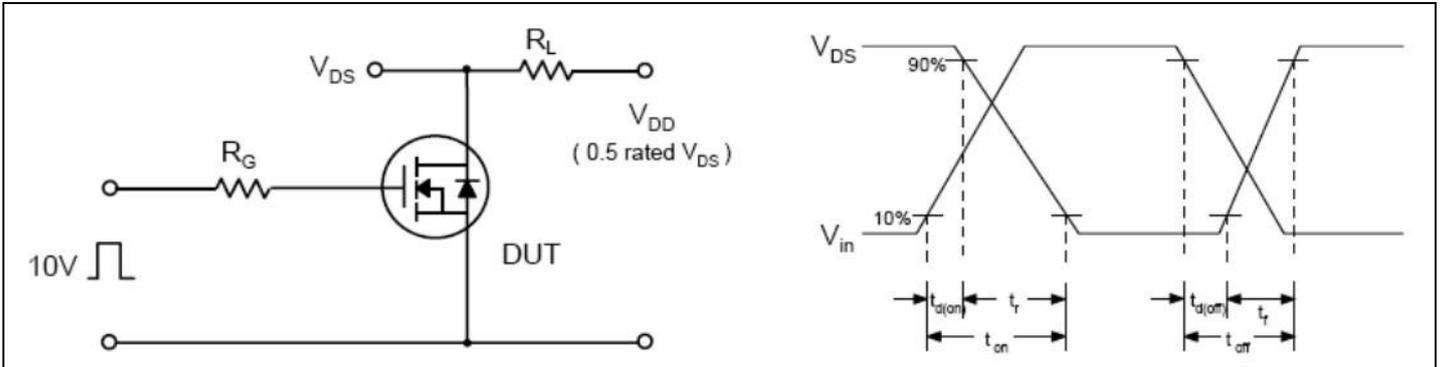


FIG.12-RESISTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

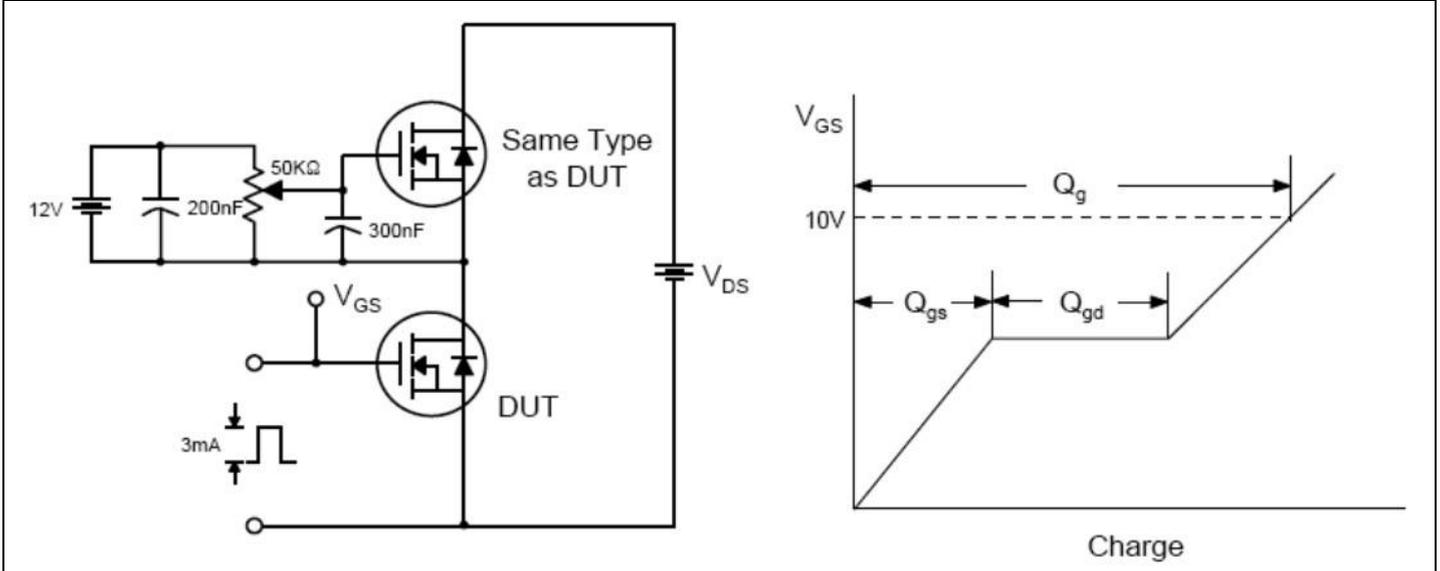


FIG.13-GATE CHARGE TEST CIRCUIT & WAVEFORM

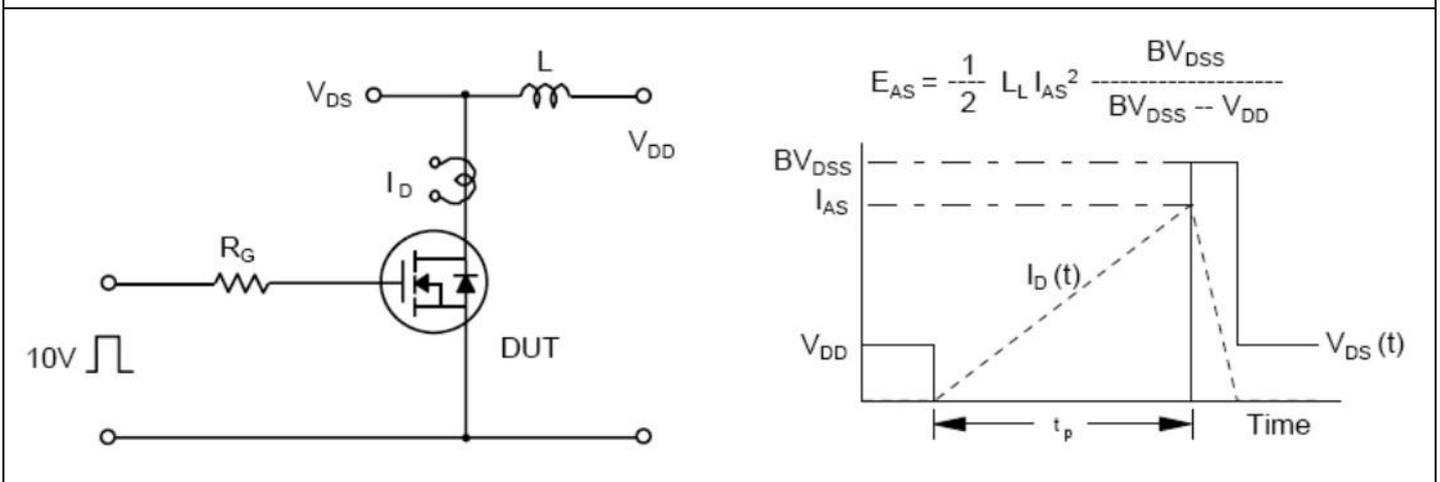


FIG.14-UNCLAMPED INDUCTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

MS13N50

500V N-Channel MOSFET

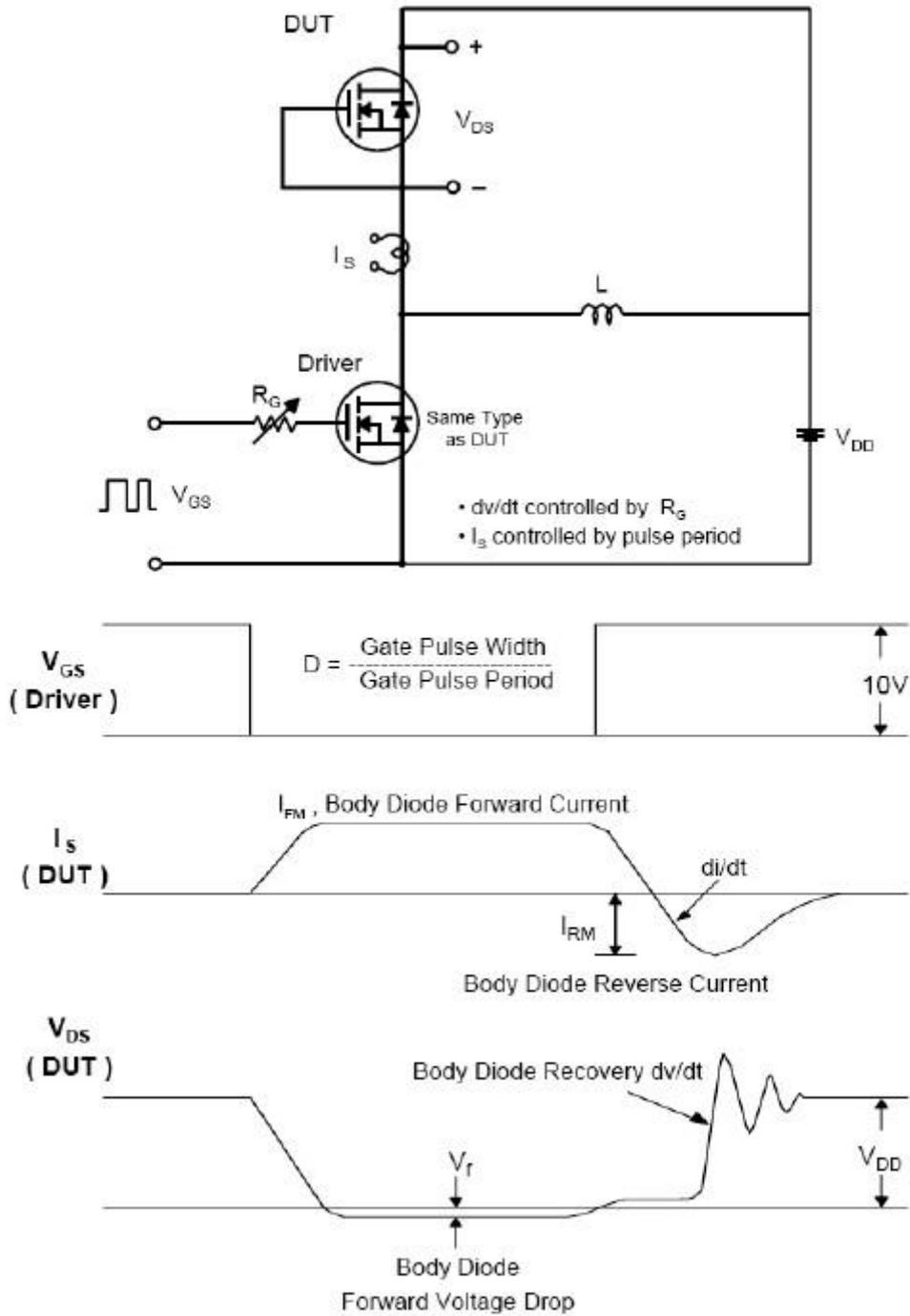


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

MS13N50

500V N-Channel MOSFET

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Bruckewell Technology Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Bruckewell"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Bruckewell makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Bruckewell disclaims

- (i) Any and all liability arising out of the application or use of any product.
- (ii) Any and all liability, including without limitation special, consequential or incidental damages.
- (iii) Any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Bruckewell's knowledge of typical requirements that are often placed on Bruckewell products in generic applications.

Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time.

Product specifications do not expand or otherwise modify Bruckewell's terms and conditions of purchase, including but not limited to the warranty expressed therein.