MS3N80

800V N-Channel MOSFET

Description

The M3N80 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

- RDS(on) (Max 2.4 Ω)@VGS=10V
- Gate Charge (Typical 15.0nC)
- Improved dv/dt Capability, High Ruggedness
- 100% Avalanche Tested
- Maximum Junction Temperature Range (150°C)
- RoHS compliant package

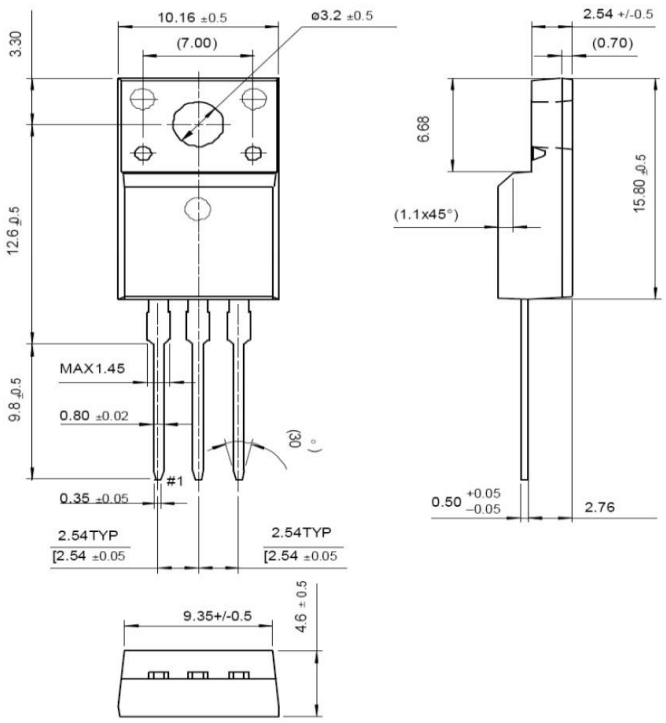
Application

- Adapter
- Switching Mode Power Supply

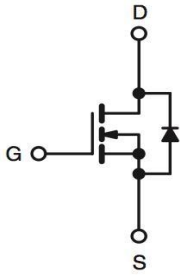
Packing & Order Information

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_{DSS}	Drain-Source Voltage	800	V
I_D	Drain Current -Continuous (TC=25°C)	3	A
	Drain Current -Continuous (TC=100°C)	1.8	A
I_{DM}	Drain Current –Pulsed	12	A
V_{GS}	Gate-Source Voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy	336	mJ
E_{AR}	Repetitive Avalanche Energy	10.7	mJ
dv/dt	Peak Diode Recovery dv/dt	4.0	V/ns
P_D	Power Dissipation (TC=25°C) - Derate above 25°C	107	W
		0.85	W/°C
T_J/T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C

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

Symbol	Parameter	Value	Unit
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 Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	1.17	°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 = 250 μA	3.0	3.8	5.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V,I_D =1.5 A	--	3.8	4.8	Ω

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V , I_D = 250μA	800	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	--	1.0	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800 V , V_{GS} = 0 V V_{DS} = 640 V , V_C = 125°C	--	--	10 100	μA
I_{GSSF}	Gate-Body Leakage Current,Forward	V_{GS} = 30 V , V_{DS} = 0 V	--	--	100	μA
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	--	550	--	pF
C_{OSS}	Coss Output Capacitance		--	60	--	pF
C_{RSS}	Crss Reverse Transfer Capacitance		--	8.0	--	pF

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Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Time	V_{DS} = 400 V, I_D = 3.0 A, R_G = 25 Ω	--	20	--	ns
t_r	Turn-On Rise Time		--	50	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	40	--	ns
tf	Turn-Off Fall Time		--	40	--	ns
Q_g	Total Gate Charge	V_{DS} = 640 V,I_D = 3.0 A, V_{GS} = 10 V	--	15	--	nC
Q_{gs}	Gate-Source Charge		--	3.5	--	nC
Q_{gd}	Gate-Drain Charge		--	7.5	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S	Continuous Source-Drain Diode Forward Current		--	--	3.0	A
I_{SM}	ISM Pulsed Source-Drain Diode Forward Current		--	--	12.0	
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 3 A , V_{GS} = 0 V	--	--	1.5	V
t_{rr}	Reverse Recovery Time	I_S =3 A , V_{GS} = 0 V diF/dt=100A/μs	--	650	--	ns
Q_{rr}	Reverse Recovery Charge		--	5.0	--	μC

Notes:

1. Repeativity rating : pulse width limited by junction temperature
2. L = 34.0mH, I_{AS} =6.0A, V_{DD} = 50V, R_G = 25Ω , Starting TJ = 25°C
3. I_{SD} ≤ 6.0A, di/dt ≤ 200A/us, 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

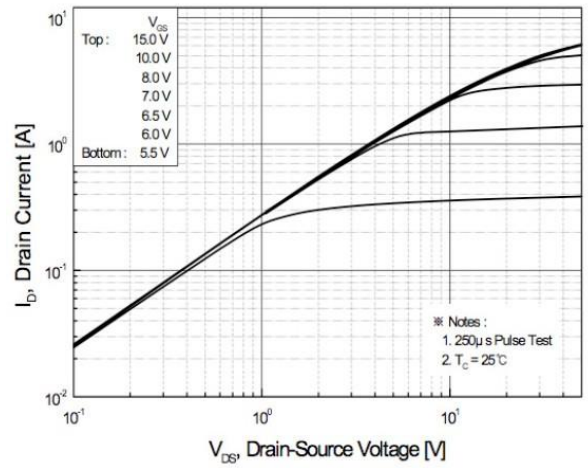

FIG.1-ON REGION CHARACTERISTICS

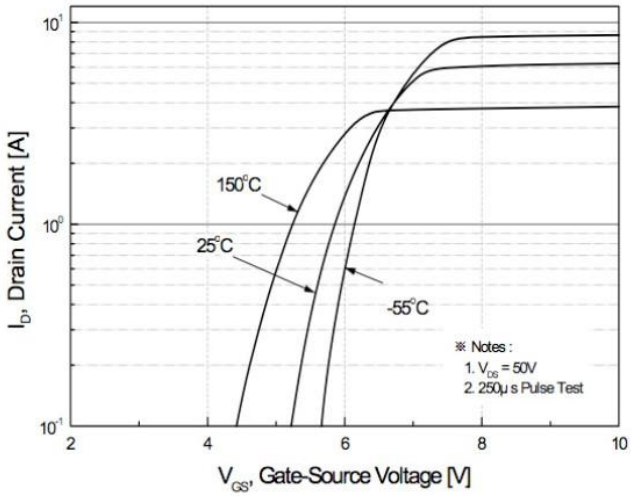

FIG.2-TRANSFER CHARACTERISTICS

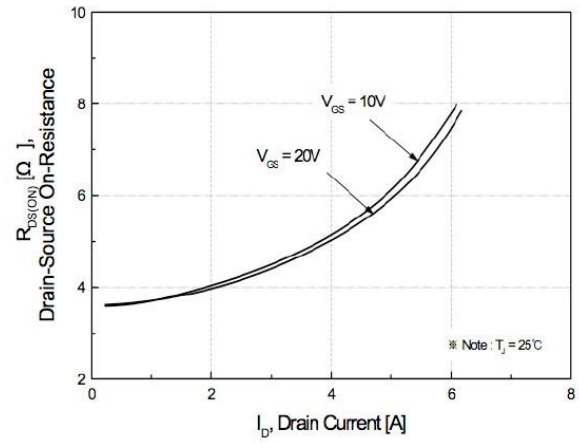

FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

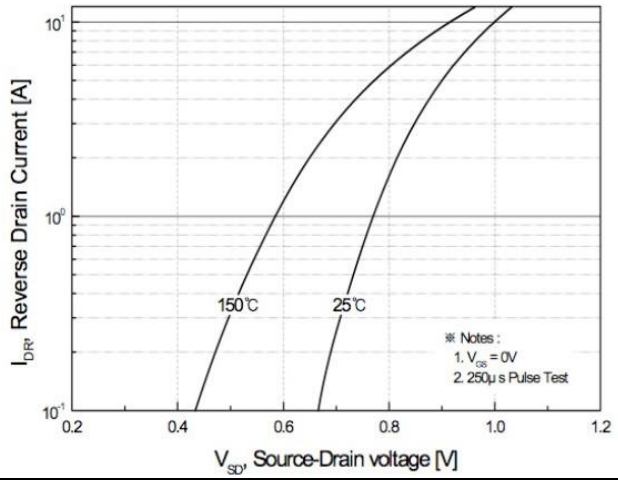

FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

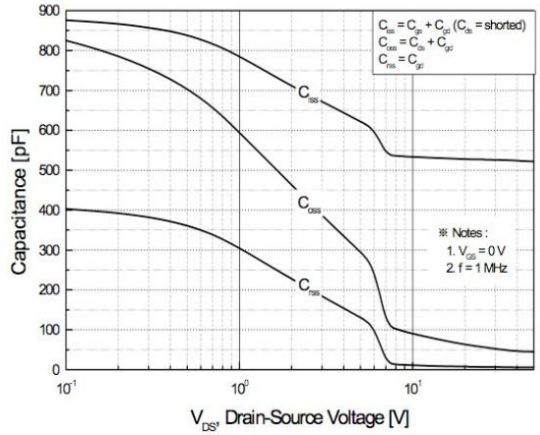

FIG.5-CAPACITANCE CHARACTERISTICS

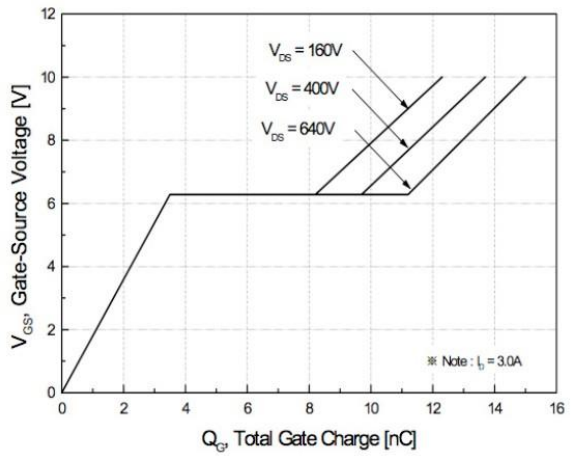

FIG.6-GATE CHARGE CHARACTERISTICS

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■Characteristics Curve

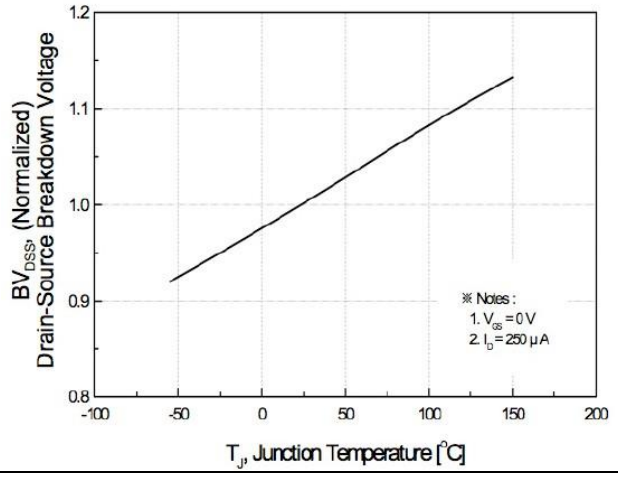

FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

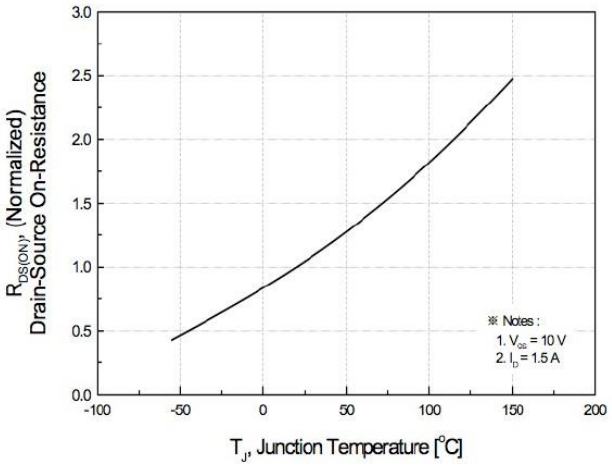

FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

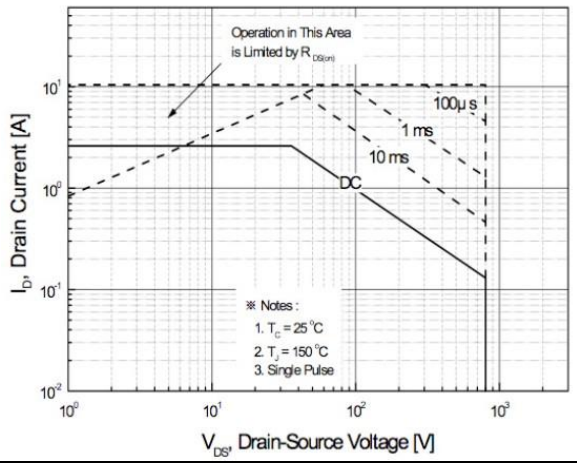

FIG.9-MAXIMUM SAFE OPERATING AREA

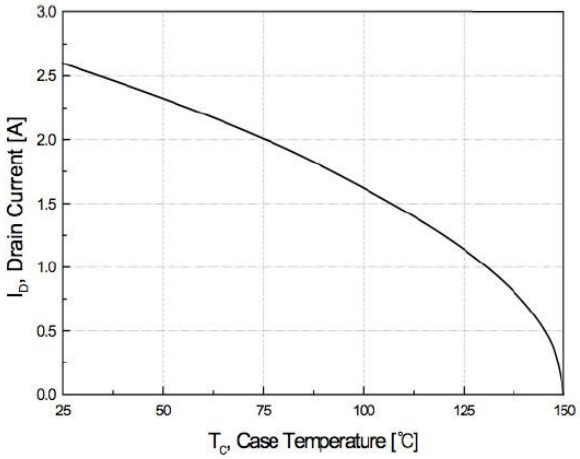

FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

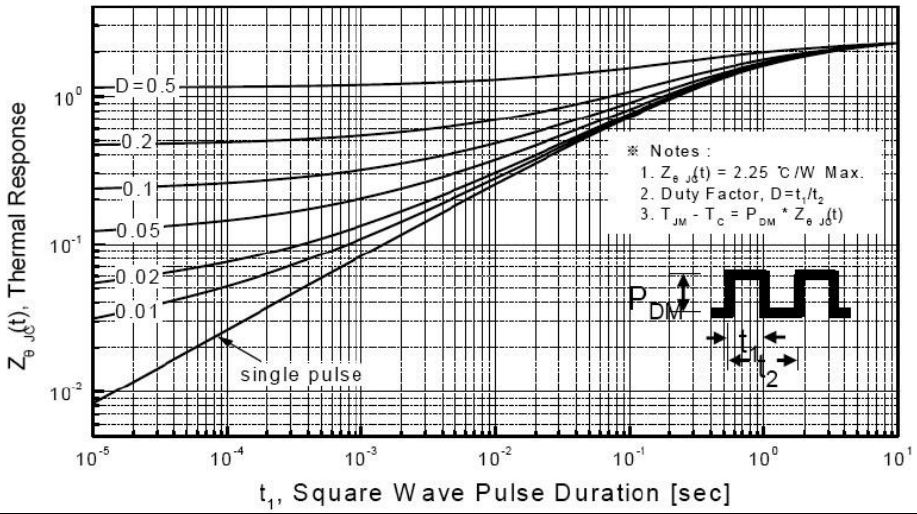

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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■Characteristics Test Circuit & Waveform

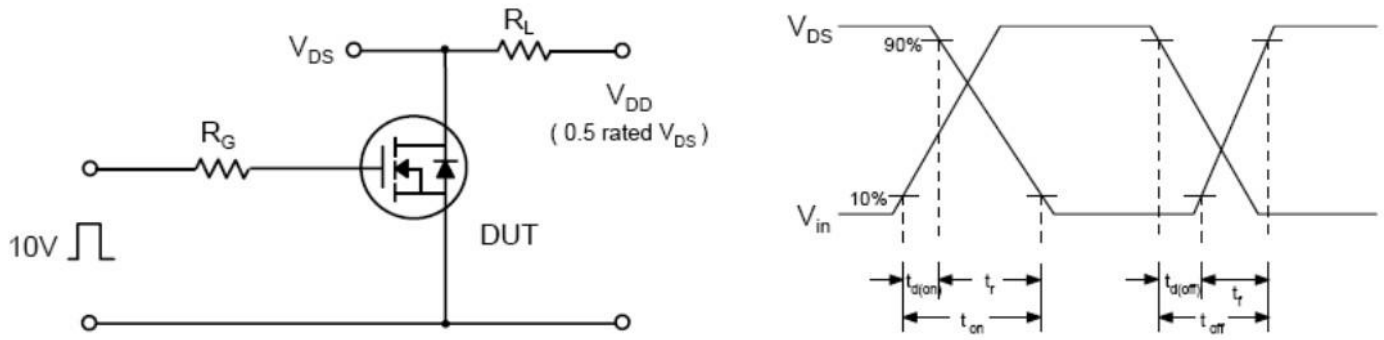

FIG.12-RESISTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

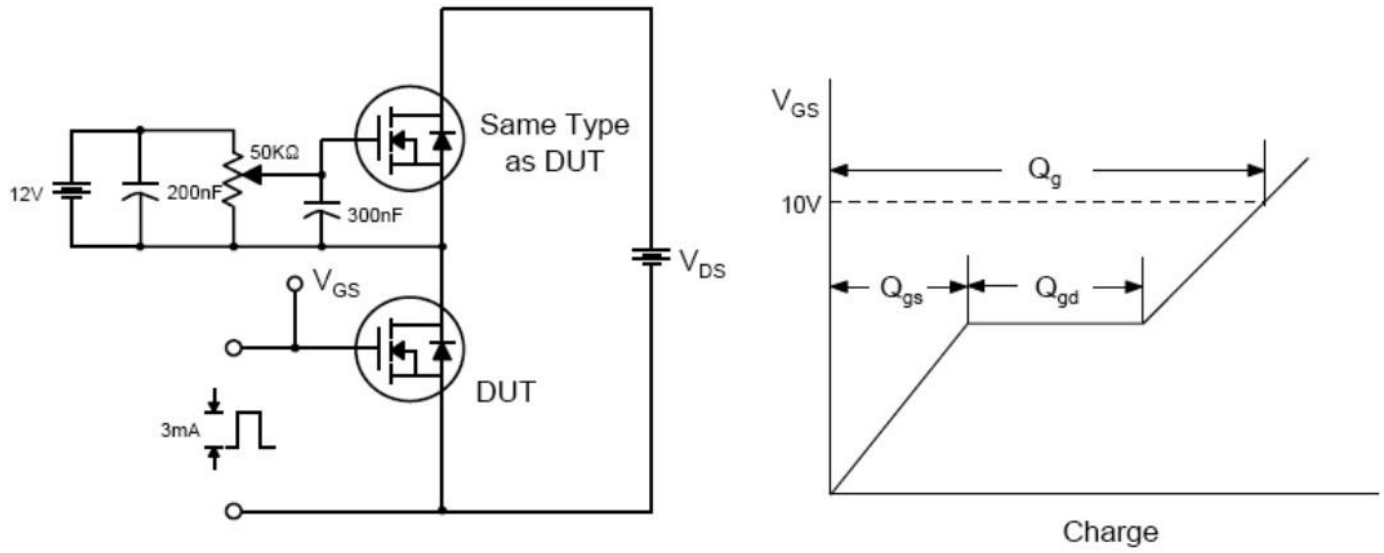

FIG.13-GATE CHARGE TEST CIRCUIT & WAVEFORM

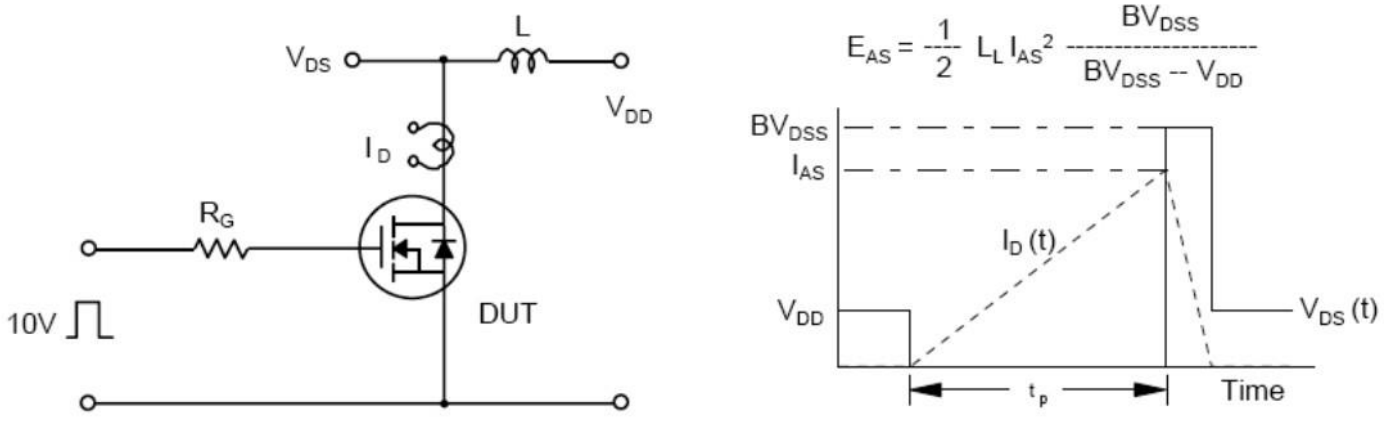

FIG.14-UNCLAMPED LINDUCTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

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