

MSD4N60

600V N-Channel MOSFET

Description

The MSD4N60 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-252 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

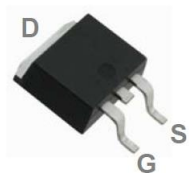
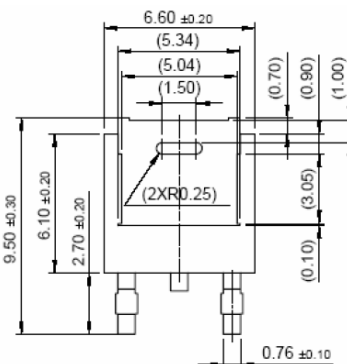
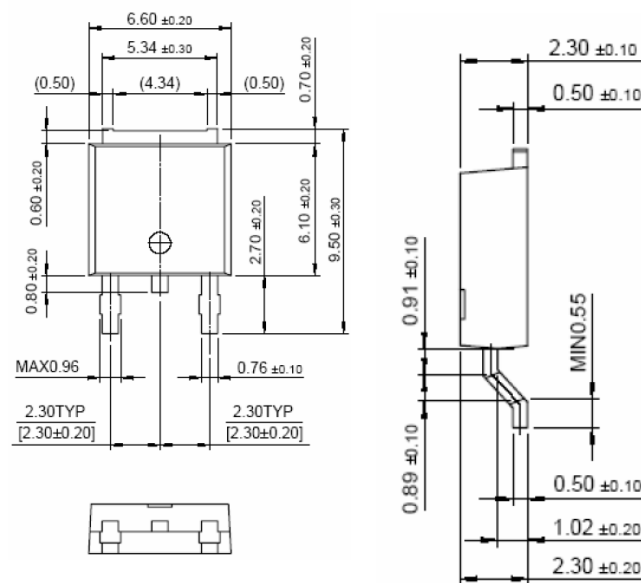
Application

- Low power battery chargers
- Switch mode power supply (SMPS)
- DC-AC converters.

Packing & Order Information

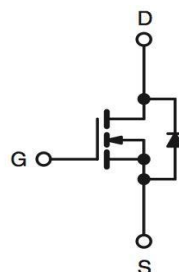
Part No./ R : 2,500/Reel

Part No./ T : 80/Tube , 4,000/Box



**RoHS
COMPLIANT**

Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	600	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Continuous Drain Current (Tc=25°C)	4.5	A
	Continuous Drain Current (Tc=100°C)	2.6	A
I _{DM}	Pulsed Drain Current	18	A

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

Symbol	Parameter	Value	Unit
EAS	Single Pulsed Avalanche Energy	33	mJ
IAR	Avalanche Current	4.0	A
EAR	Repetitive Avalanche Energy	10	mJ
dV/dt	Peak Diode Recovery dV/dt	4.5	V/ns
P _D	Power Dissipation (T _C =25°C)	31	W
	Derating Factor above 25 °C	0.25	W
T _J	Storage Temperature	150	°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

Note:

- 1.Repetitive rating; pulse width limited by maximum junction temperature.
2. I_{AS}=4A, V_{DD}=50V, L=8mH, V_G=10V, starting T_J=+25°C.
3. I_{SD}≤4A, dl/dt≤100A/μs, V_{DD}≤BVDSS, starting T_J=+25°C.

Thermal Resistance Characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value			Units
		Min.	Typ.	Max.	
R _{θJC}	Thermal Resistance,Junction-to-Case	--	--	2.8	°C/W
R _{θJA}	Thermal Resistance,Junction-to- Ambient	--	--	50	

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	--	0.60	--	V/°C
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	4.0	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} = 600 V , V _{GS} = 0 V V _{DS} = 480 V , T _C = 125°C	--	--	1 10	uA
I _{GSS}	Gate-Body Leakage Forward	V _{GS} = ±30	--	--	±100	nA
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10 V , I _D = 2.25 A	--	2.0	2.5	Ω

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Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ $F = 1.0\text{MHz}$	--	560	--	pF
C_{OSS}	Output Capacitance		--	55	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	7	--	pF
$t_{d(on)}$	Turn-On Time	$V_{DD} = 300 \text{ V}, I_D = 4.5 \text{ A},$ $R_G = 25 \Omega, V_{GS} = 10 \text{ V}$	--	10	30	ns
t_r	Turn-On Time		--	40	80	ns
$t_{d(off)}$	Turn-Off Delay Time		--	40	100	ns
t_f	Turn-Off Fall Time		--	50	90	ns
Q_g	Total Gate Charge	$V_{DD} = 480 \text{ V}, I_D = 4.5 \text{ A},$ $V_{GS} = 10 \text{ V}$	--	16	--	nC
Q_{gs}	Gate-Source Charge		--	2.5	--	nC
Q_{gd}	Gate-Drain Charge		--	6.5	--	nC

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S		$V_D = V_G = 0$	--	--	4.0	A
I_{SM}			--	--	16	
V_{SD}		$I_S = 4.0 \text{ A}, V_{GS} = 0 \text{ V}$	--	--	1.4	V
t_{rr}		$I_F = 4.0 \text{ A}, V_{GS} = 0 \text{ V}$ $diF/dt = 100\text{A}/\mu\text{s}$	--	270	--	ns
Q_{rr}			--	18	--	uC

*Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

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■ Characteristics Curve

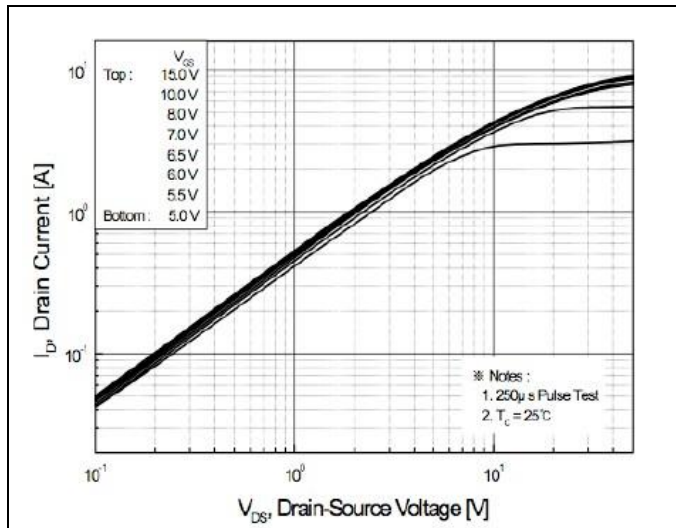


FIG.1-ON REGION CHARACTERISTICS

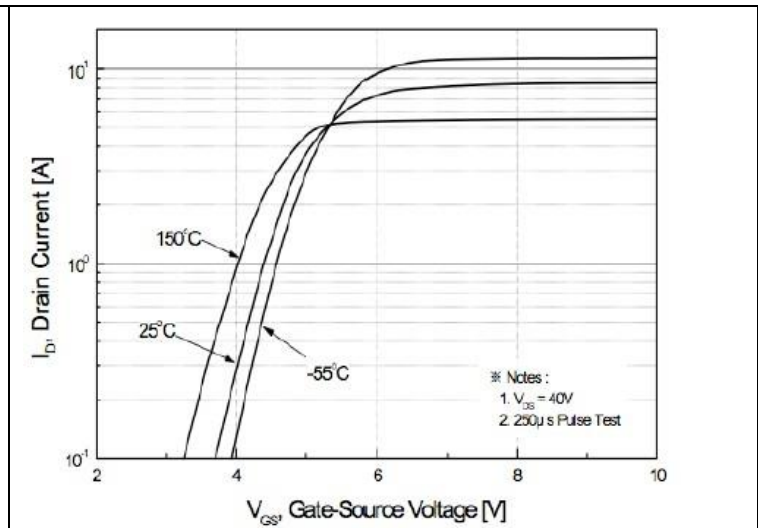


FIG.2-TRANSFER CHARACTERISTICS

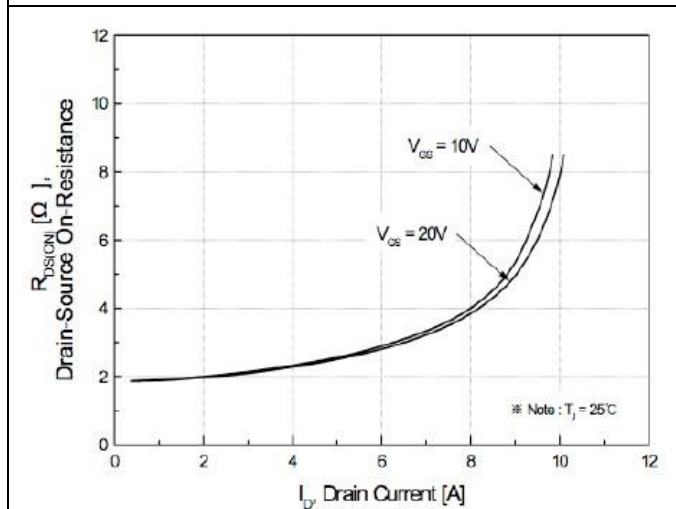


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

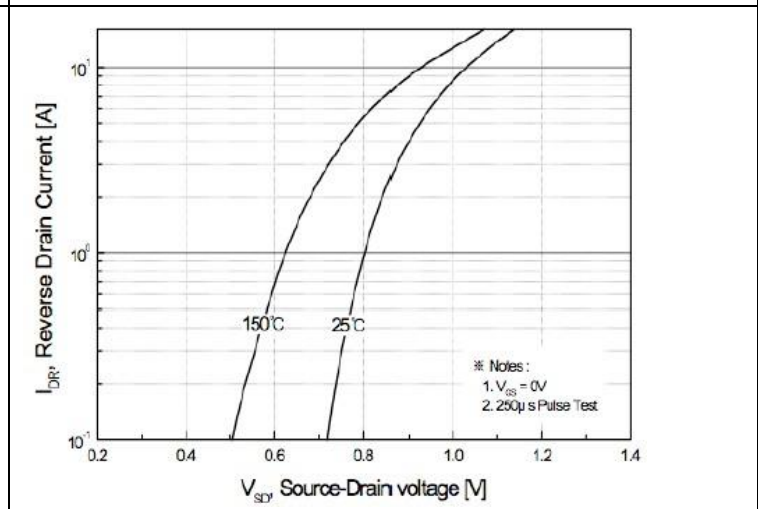


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

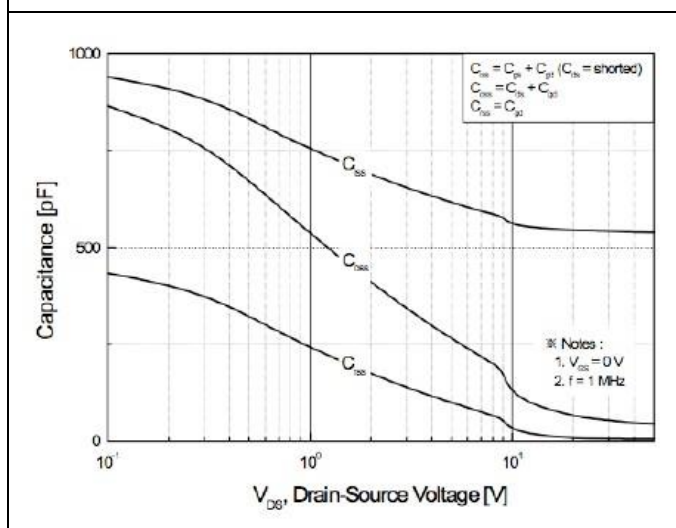


FIG.5-CAPACITANCE CHARACTERISTICS

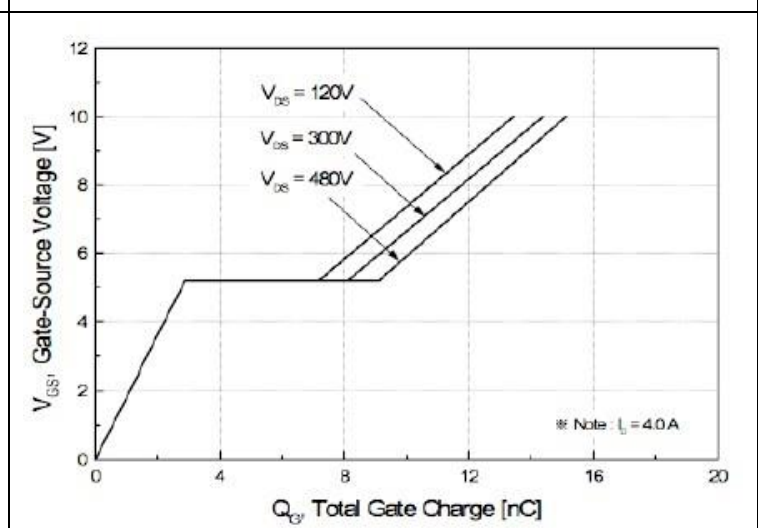


FIG.6-GATE CHARGE CHARACTERISTICS

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■ Characteristics Curve

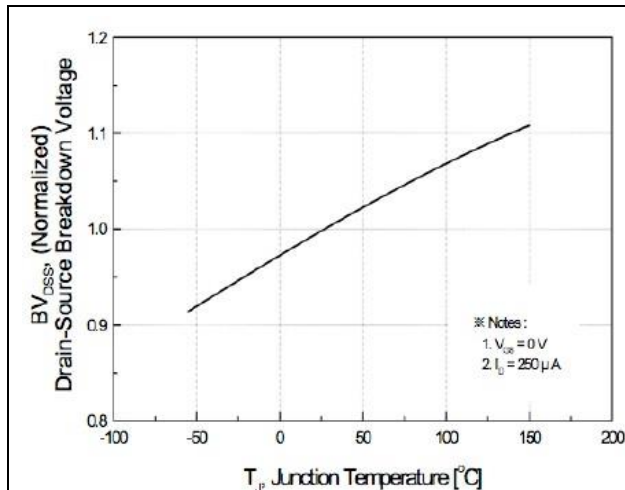


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

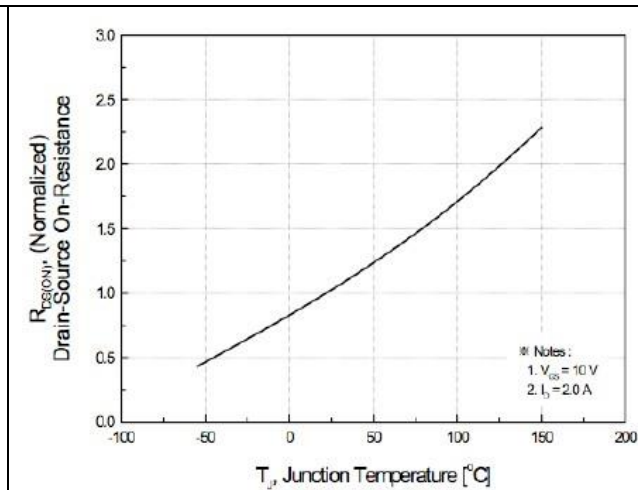


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

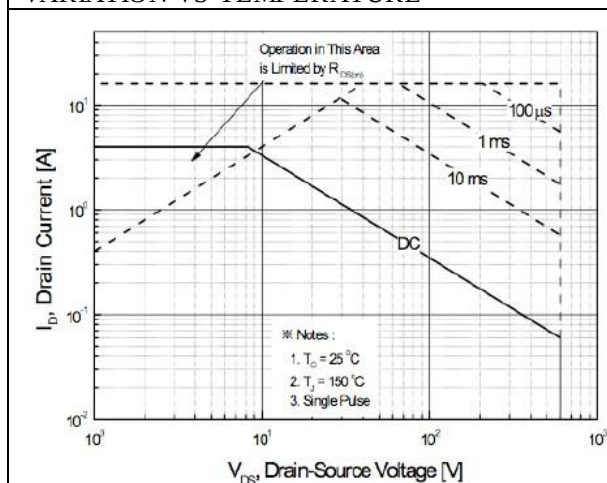


FIG.9-MAXIMUM SAFE OPERATING AREA

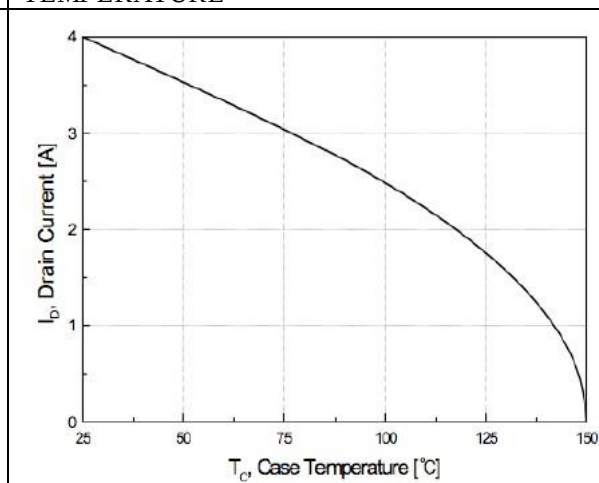


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

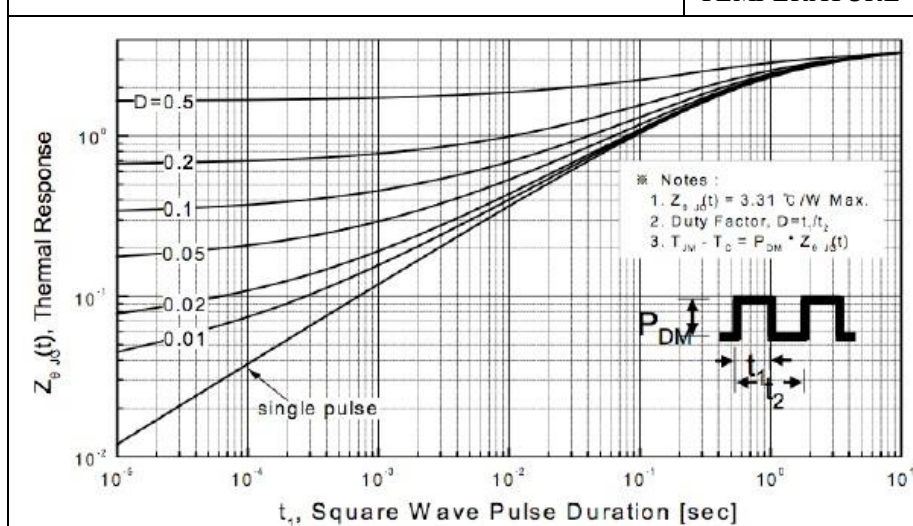


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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■ Characteristics Test Circuit & Waveform

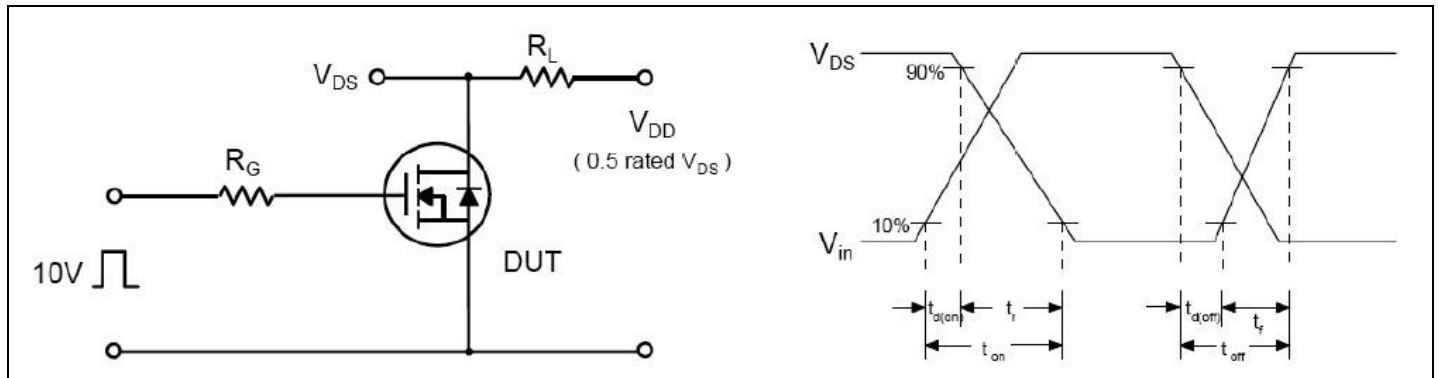


Fig 12. Resistive Switching Test Circuit & Waveforms

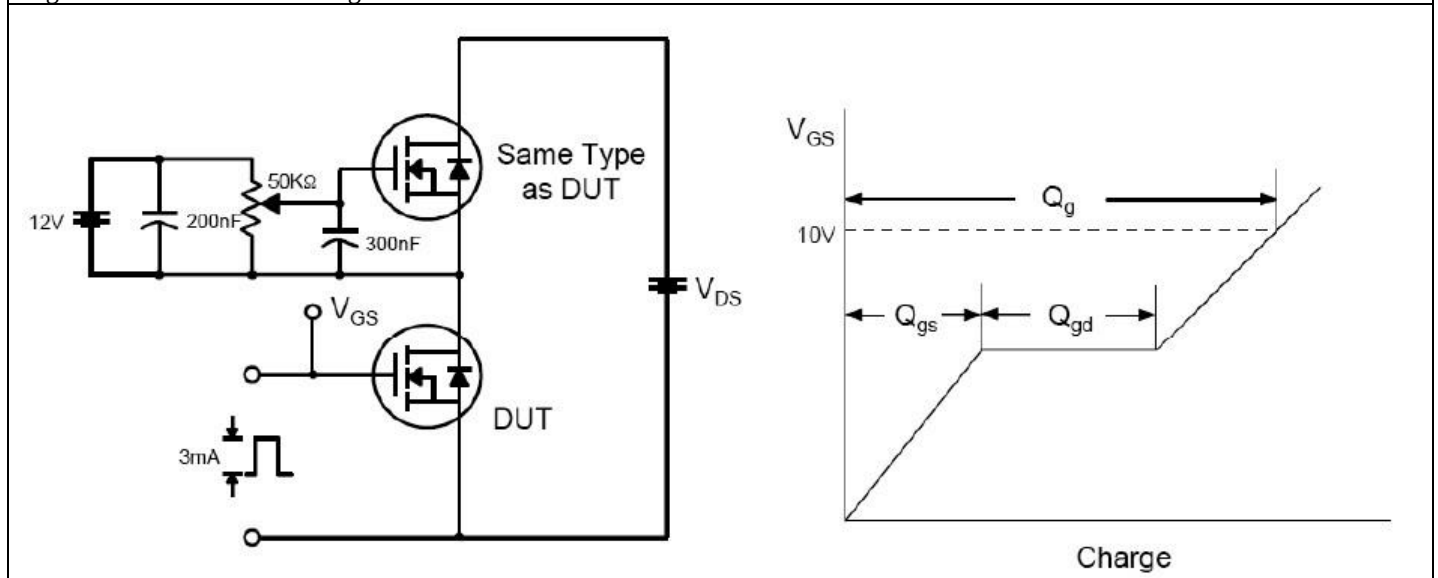


Fig 13. Gate Charge Test Circuit & Waveform

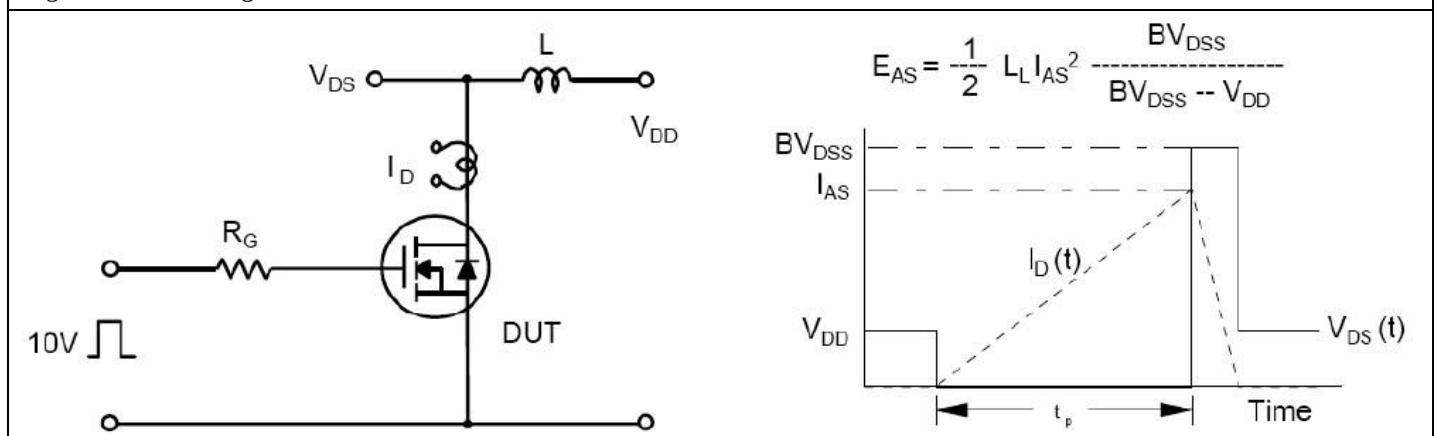


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

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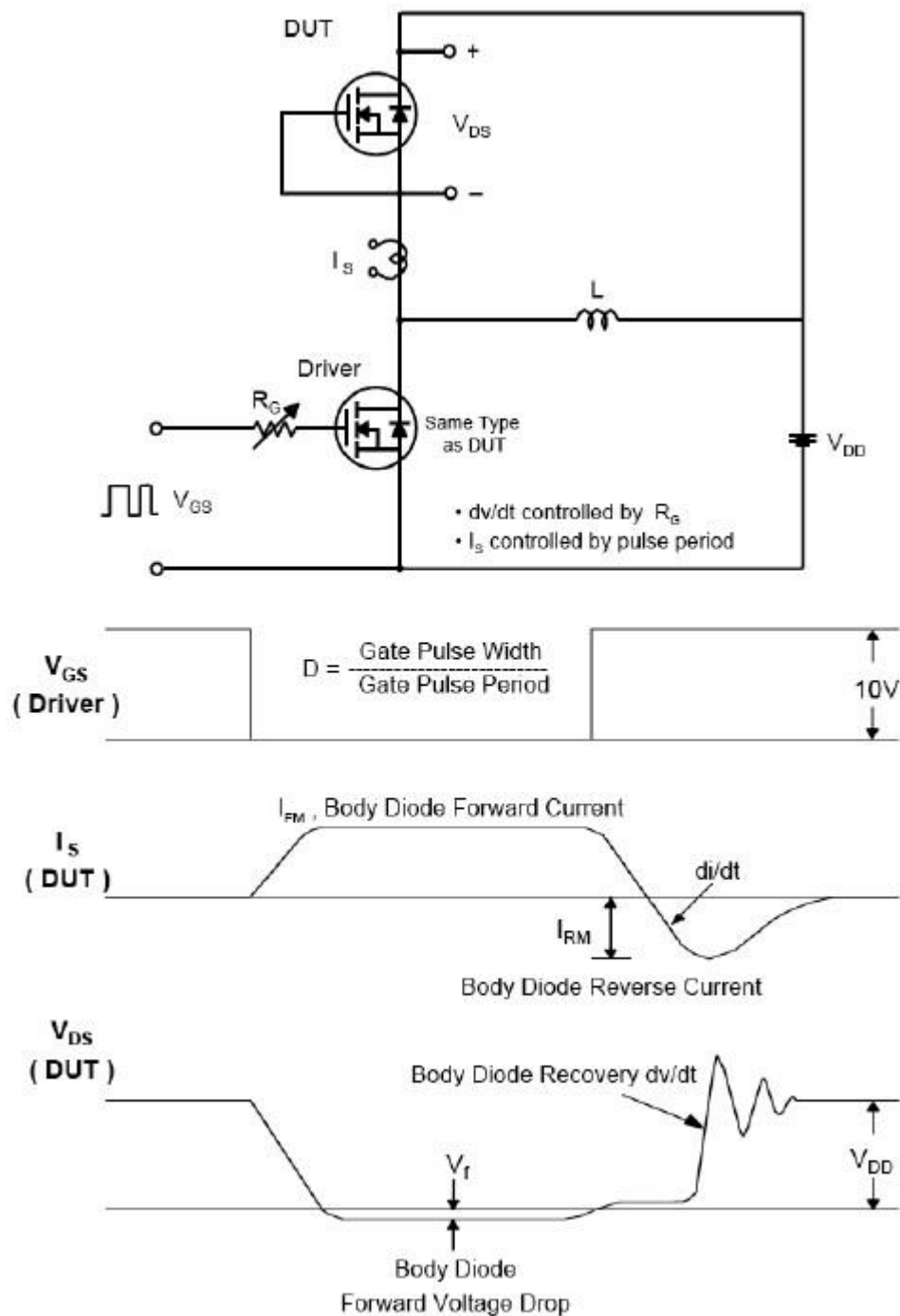


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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