

MSU2N70

700V N-Channel MOSFET

Description

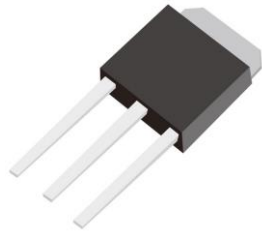
The MSU2N70 is a N-channel enhancement-mode MOSFET , providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-251 package is universally preferred for all commercial-industrial applications

Features

- 100% EAS Test
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge: 10.5 nC (Typ.)
- Extended Safe Operating Area
- Lower RDS(ON) : 5.5 Ω (Typ.) @VGS=10V
- Extremely Low Intrinsic Capacitances
- RoHS compliant package

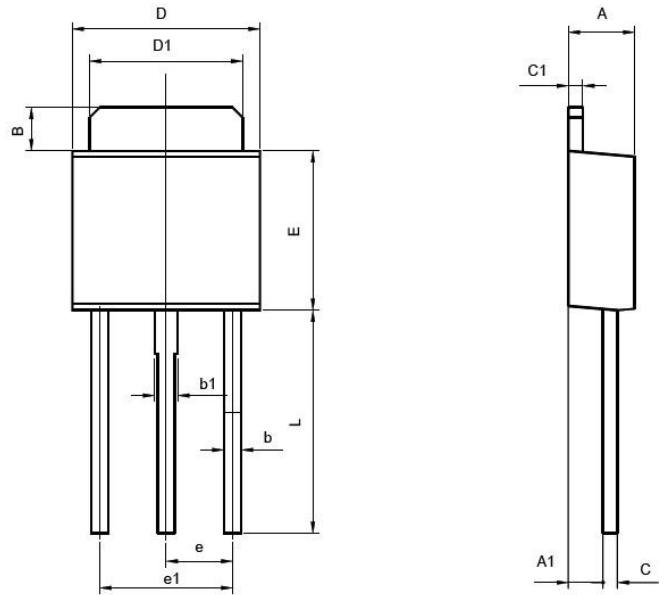
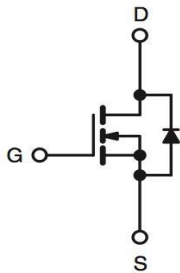
Packing & Order Information

80/Tube ; 4,000/Box



**RoHS
COMPLIANT**

Graphic symbol



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	min	max	min	max
A	2.15	2.45	0.85	0.96
A1	1.00	1.40	0.39	0.55
B	1.25	1.75	0.49	0.69
b	0.45	0.75	0.18	0.3
b1	0.65	0.95	0.26	0.37
C	0.38	0.64	0.15	0.25
C1	0.38	0.64	0.15	0.25
D	6.30	6.70	2.48	2.64
D1	5.10	5.50	2.01	2.17
E	5.30	5.70	2.09	2.24
e	2.3 (typ.)		0.91 (typ.)	
e1	4.4	4.8	1.73	1.89
L	7.4	8.0	2.91	3.15

MSU2N70

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	700	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current -Continuous (TC=25°C)	1.6	A
	Drain Current -Continuous (TC=100°C)	1.0	A
I _{DM}	Drain Current Pulsed	6	A
E _{AS}	Single Pulsed Avalanche Energy	110	mJ
E _{AR}	Repetitive Avalanche Energy	4.4	mJ
I _{AR}	Avalanche Current	1.6	A
dV/dt	Peak Diode Recovery dV/dt	5.5	V/ns
P _D	Power Dissipation (TC = 25 °C)	44	W
	- Derate above 25°C	0.22	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C

NOTE:

1. Repetitive rating; pulse width limited by maximum junction temperature.

Thermal Resistance Characteristics

Symbol	Parameter	Max.	Units
R _{θJC}	Junction-to-Case	1.72	°C/W
R _{θJA}	Junction-to-Ambient	83.3	

Thermal Resistance Characteristics

Symbol	Parameter	Max.	Units
R _{thjc}	Typical thermal resistance	2.87	°C/W
R _{θJA}		55*	

* When mounted on the minimum pad size recommended (PCB Mount)

Static Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
V _{GS}	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	4.0	V
*R _{DS(ON)}	V _{GS} = 10 V, I _D = 1 A	--	5.5	6.0	Ω
BV _{DSS}	V _{GS} = 0 V, I _D = 250μA	700	--	--	V
ΔBV _{DSS} /ΔT _J	I _D = 250μA, Referenced to 25°C	--	0.7	--	
I _{DSS}	V _{DS} = 700 V, V _{GS} = 0 V	--	--	10	μA
	V _{DS} = 560 V, T _C = 125°C	--	--	100	
I _{GSSF}	V _{GS} = 30 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	V _{GS} = -30 V, V _{DS} = 0 V	--	--	-100	nA

MSU2N70

700V N-Channel MOSFET

Dynamic Characteristics					
Symbol	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	$V_{DS} = 350\text{ V}, I_D = 1.6\text{ A},$ $R_G = 25\ \Omega$	--	10	20	ns
t_r		--	25	50	ns
$t_{d(off)}$		--	20	40	ns
t_f		--	25	50	ns
Q_g	$V_{DS} = 560\text{ V}, I_D = 1.6\text{ A},$ $V_{GS} = 10\text{ V}$	--	10.5	14	nC
Q_{gs}		--	2.0	--	nC
Q_{gd}		--	4.0	--	nC
C_{ISS}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $F = 1.0\text{ MHz}$	--	340	445	pF
C_{OSS}		--	45	60	pF
C_{RSS}		--	7.5	10	pF

Source-Drain Diode Maximum Ratings and Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S			--	--	1.6	A
I_{SM}			--	--	6	
V_{SD}	$I_S = 1.6\text{ A}, V_{GS} = 0\text{ V}$		--	--	1.5	V
t_{rr}	$I_S = 1.6\text{ A}, V_{GS} = 0\text{ V}$ $diF/dt = 100\text{ A}/\mu\text{s}$		--	250	--	ns
Q_{rr}			--	1.2	--	uC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=1.6\text{ A}, V_{DD}=50\text{ V}, R_G=25\text{ W},$ Starting $T_J=25^\circ\text{C}$
3. $I_{SD}\leq 1.6\text{ A}, di/dt\leq 300\text{ A}/\mu\text{s}, V_{DD}\leq BV_{DSS},$ Starting $T_J=25^\circ\text{C}$
4. Pulse Test: Pulse Width $\leq 300\mu\text{s},$ Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

MSU2N70

700V N-Channel MOSFET

■ Characteristics Curve

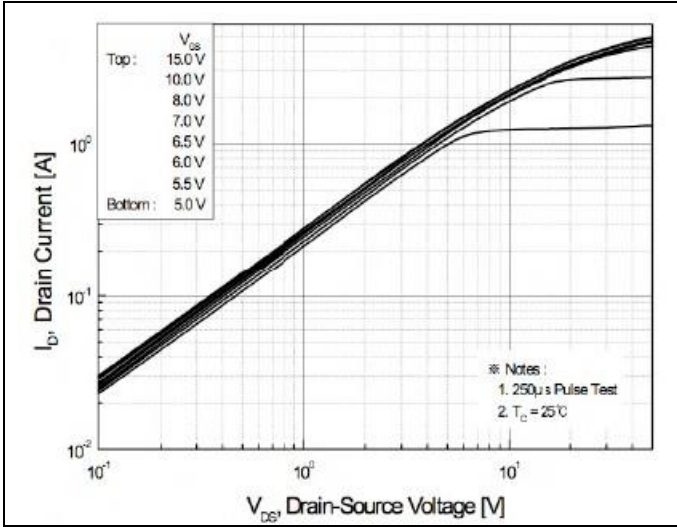


FIG.1-ON REGION CHARACTERISTICS

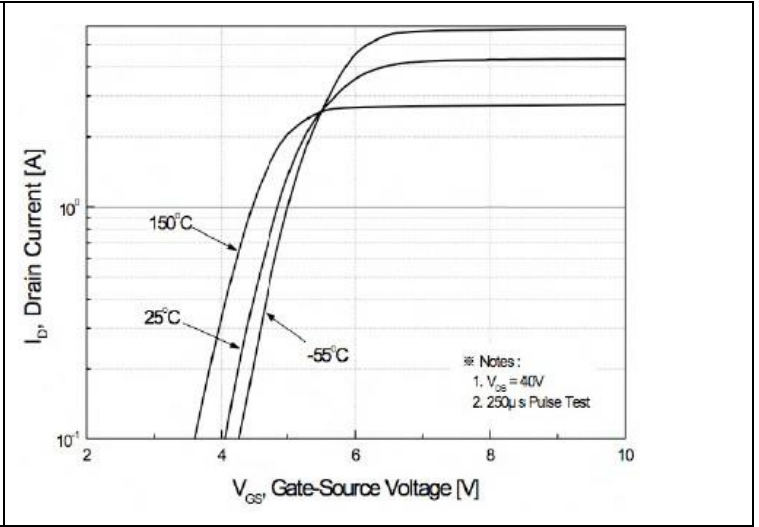


FIG.2-TRANSFER CHARACTERISTICS

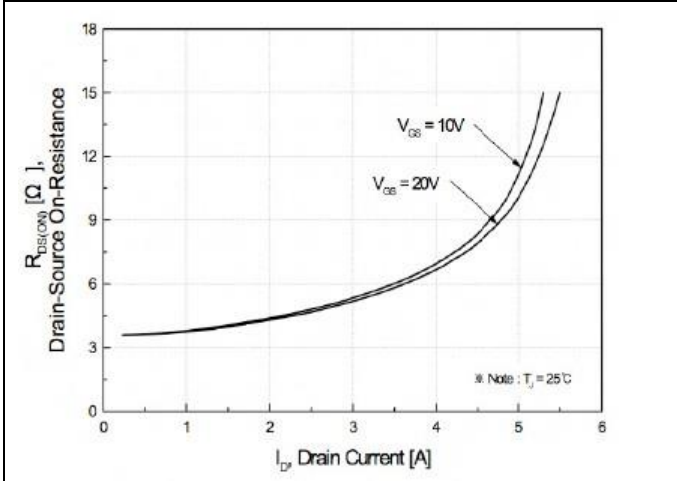


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

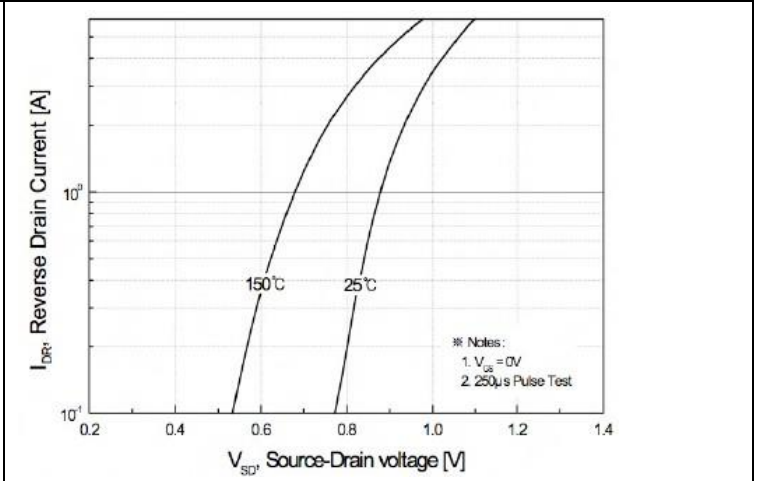


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

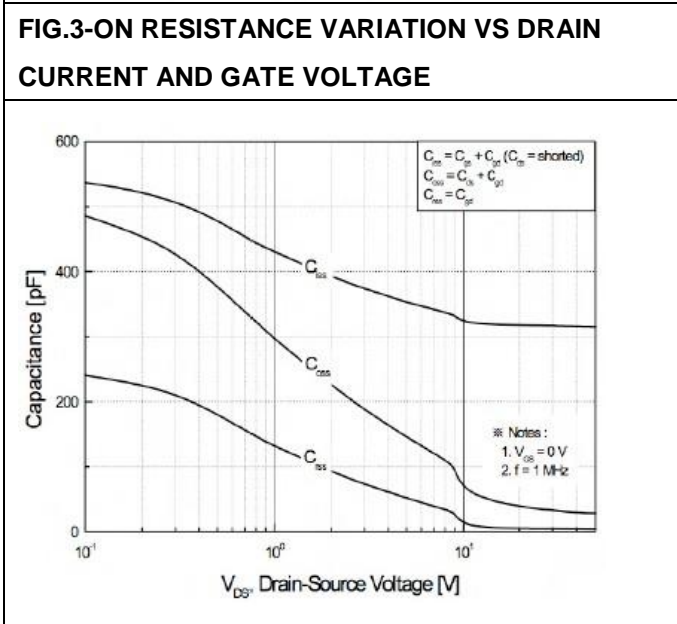


FIG.5-CAPACITANCE CHARACTERISTICS

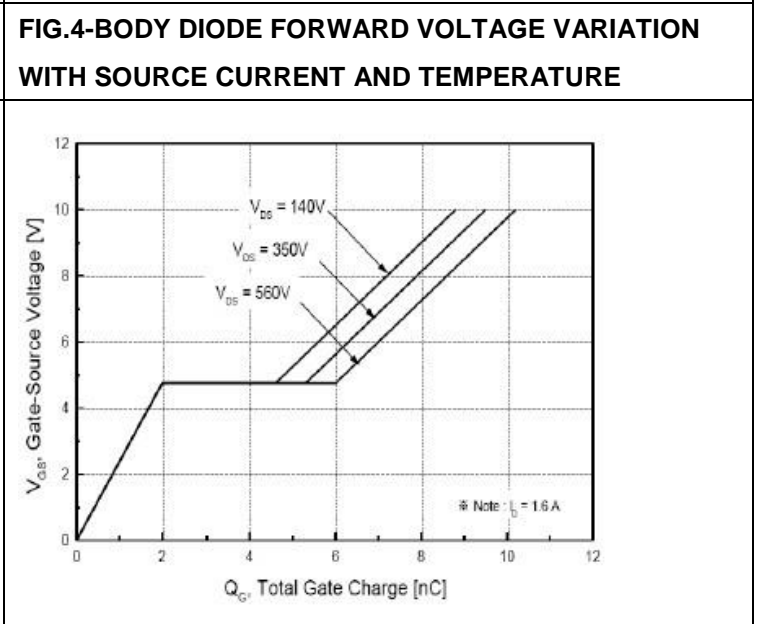


FIG.6-GATE CHARGE CHARACTERISTICS

MSU2N70

700V N-Channel MOSFET

■ Characteristics Curve

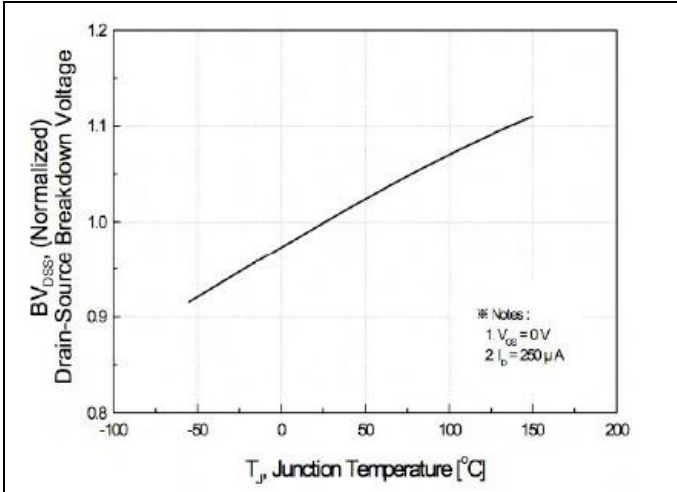


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

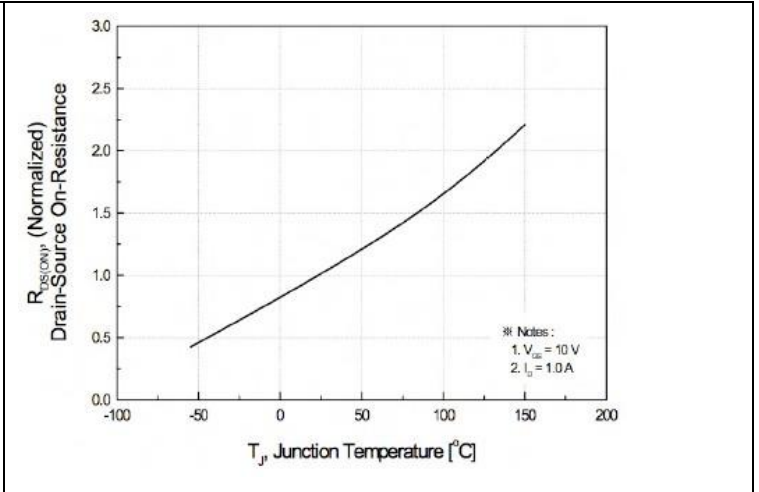


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

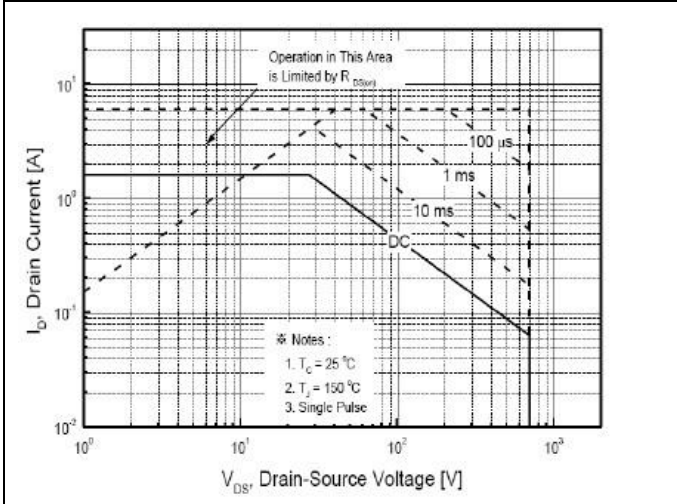


FIG.9-MAXIMUM SAFE OPERATING AREA

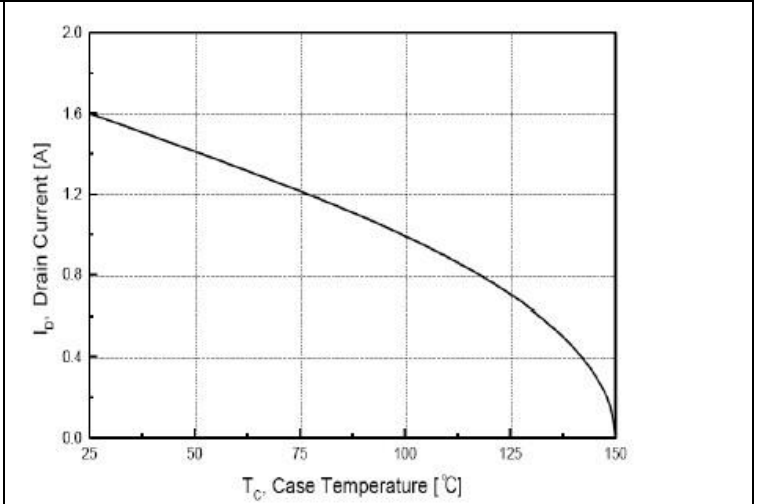


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

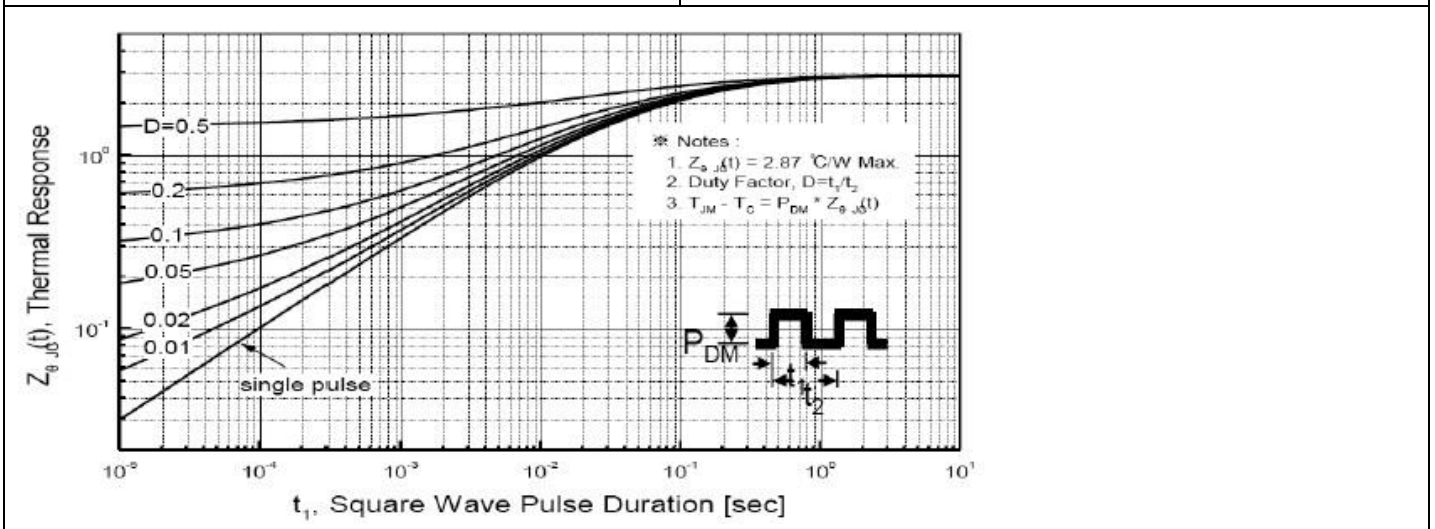


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

MSU2N70

700V N-Channel MOSFET

■ Characteristics Test Circuit & Waveform

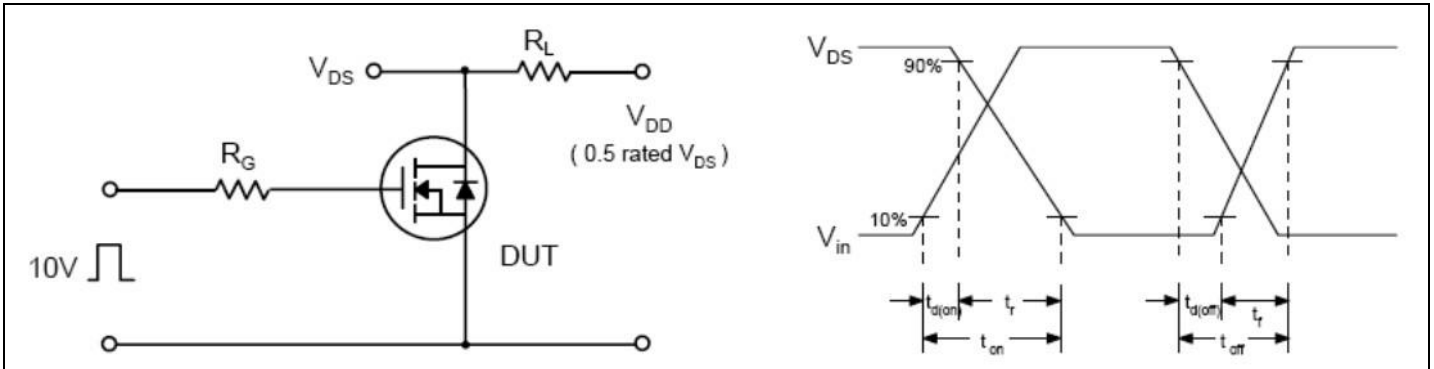


FIG.12-RESISTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

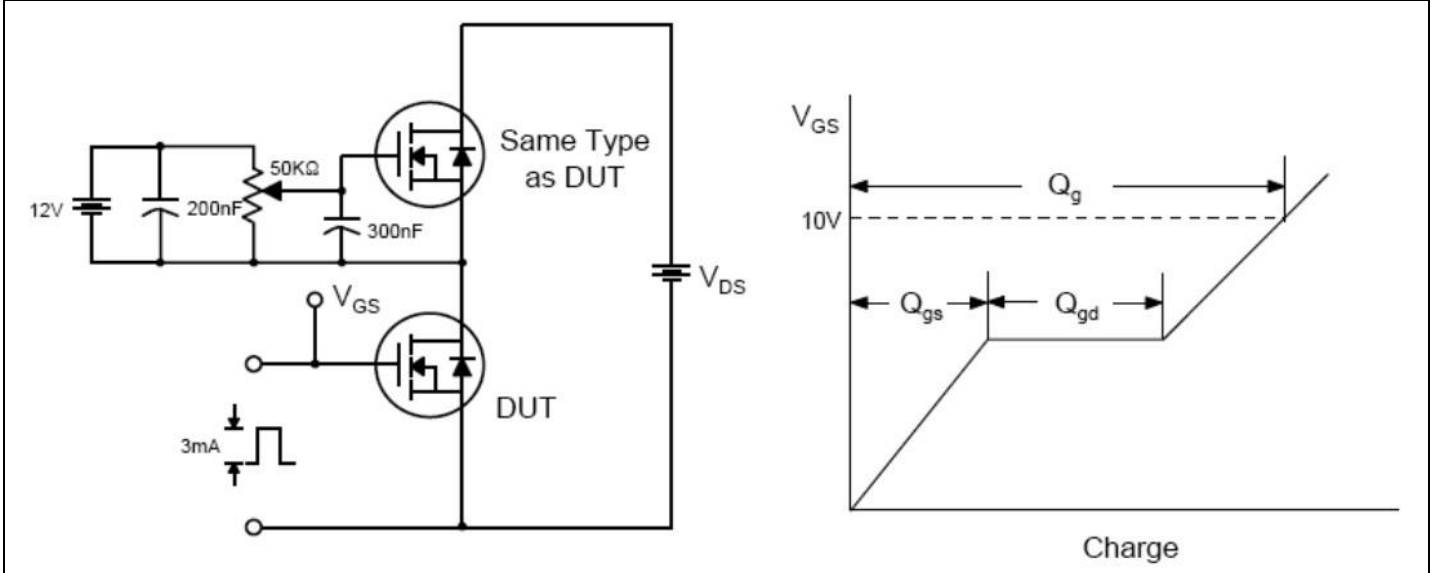


FIG.13-GATE CHARGE TEST CIRCUIT & WAVEFORM

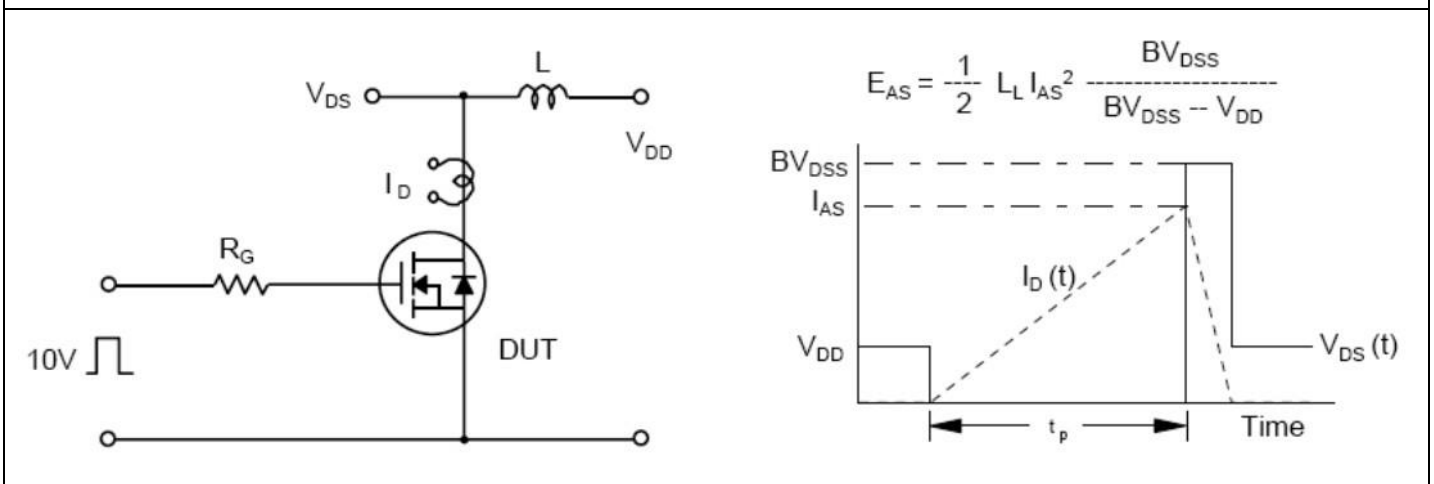


FIG.14-UNCLAMPED INDUCTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

MSU2N70

700V N-Channel MOSFET

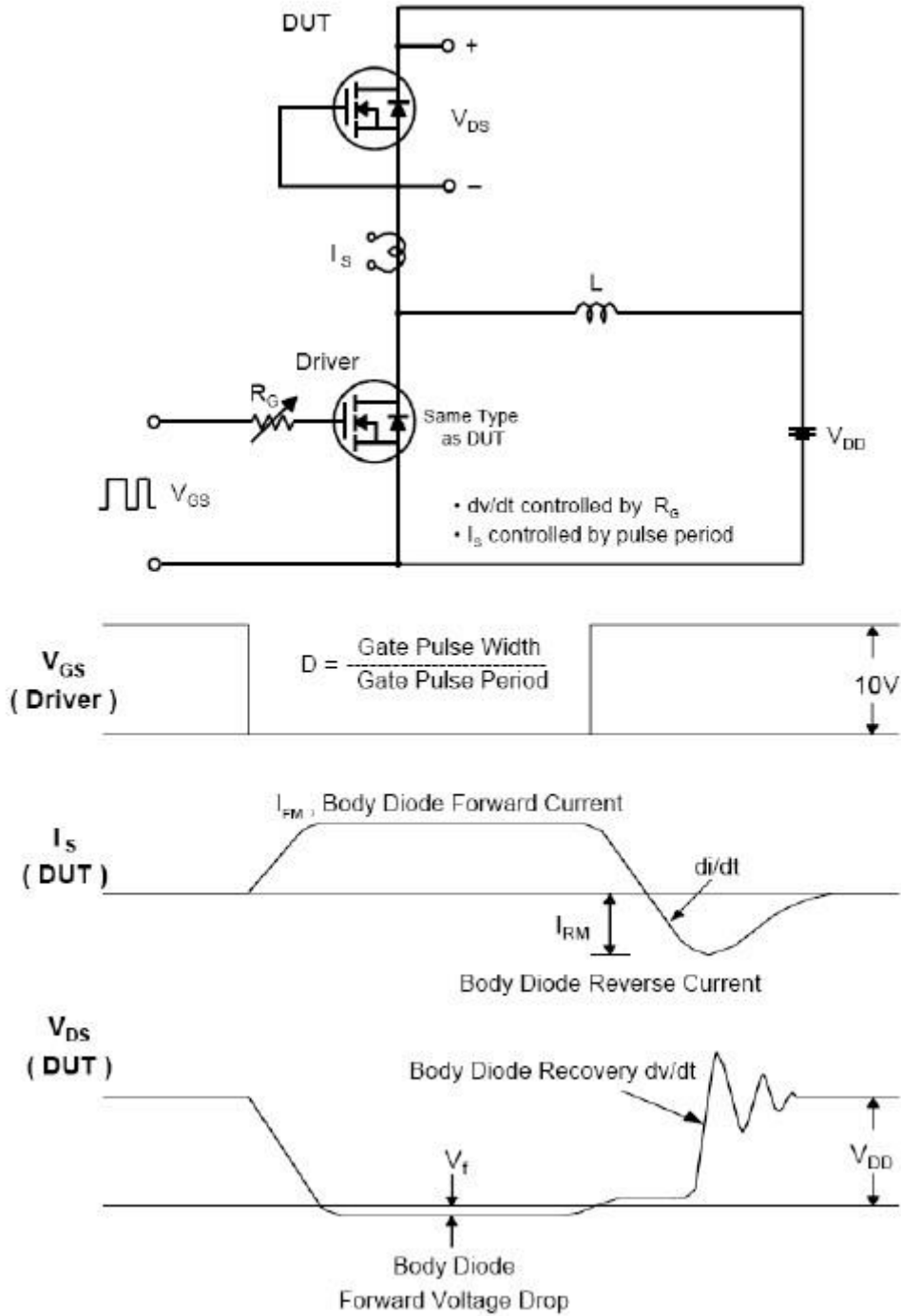


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

MSU2N70

700V N-Channel MOSFET

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