

MSF6N90

900V N-Channel MOSFET

Description

The MS15N50 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 ITO-220 package is universally preferred for all commercial-industrial applications

Features

- RDS(on) (Max 2.4 Ω)@VGS=10V
- Gate Charge (Typical 33nC)
- Improved dv/dt Capability, High Ruggedness
- 100% Avalanche Tested
- Maximum Junction Temperature Range (150°C)
- RoHS compliant package

Application

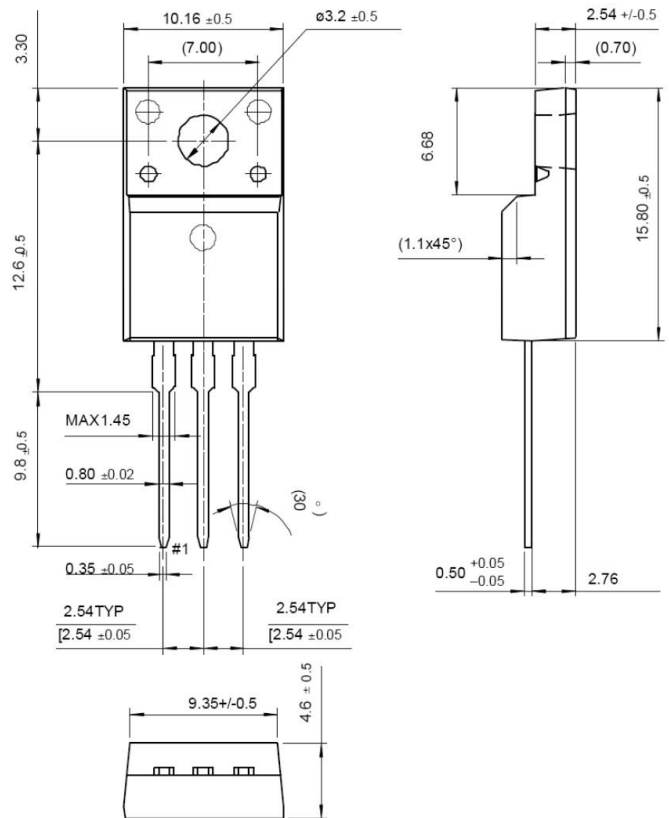
- Power Factor Correction
- LCD TV Power
- Full and Half Bridge Power

Packing & Order Information

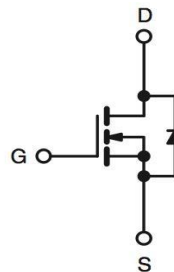
50/Tube ; 1,000/Box



**RoHS
COMPLIANT**



Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	900	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current -Continuous (TC=25°C)	6	A
	Drain Current -Continuous (TC=100°C)	3.8	A
I _{DM}	Drain Current Pulsed	24	A
E _{AS}	Single Pulsed Avalanche Energy	650	mJ
E _{AR}	Repetitive Avalanche Energy	16.7	mJ
dv/dt	Peak Diode Recovery dv/dt	4.5	V/ns

MSF6N90

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Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
P_D	Total Power Dissipation ($T_C = 25^\circ\text{C}$)	56	W
	Derating Factor above 25°C	0.48	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

- Drain current limited by maximum junction temperature

Thermal characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	2.25	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient	62.5	

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
V_{GS}	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	3.0	--	5.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=3\text{A}$	--	1.95	2.4	Ω

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	900	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu\text{A}$, Referenced to 25°C	--	1.03	--	V/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=900\text{V}, V_{GS}=0\text{V}$ $V_{DS}=720\text{V}, T_C=125^\circ\text{C}$	--	--	10 100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS}=30\text{V}, V_{DS}=0\text{V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS}=-30\text{V}, V_{DS}=0\text{V}$	--	--	-100	nA

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	Input Capacitance	$V_{DS}=25\text{V}, V_{GS}=0\text{V},$ $f=1.0\text{MHz}$	--	1500	2010	pF
C_{OSS}	Output Capacitance		--	145	190	pF
C_{RSS}	Reverse Transfer Capacitance		--	15	20	pF

MSF6N90

900V N-Channel MOSFET

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Time	$V_{DS}=450\text{ V}, I_D=6\text{ A},$ $R_G=25\Omega$	--	40	80	ns
t_r	Turn-On Time		--	120	240	ns
$t_{d(off)}$	Turn-Off Delay Time		--	60	120	ns
t_f	Turn-Off Fall Time		--	70	140	ns
Q_g	Total Gate Charge	$V_{DS}=720\text{ V}, I_D=6\text{ A},$ $V_{GS}=10\text{ V}$	--	33	45	nC
Q_{gs}	Gate-Source Charge		--	10	--	nC
Q_{gd}	Gate-Drain Charge		--	13	--	nC

Source-Drain Diode Maximum Ratings and Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S	Continuous Source-Drain Diode Forward Current		--	--	6.0	A
I_{SM}	ISM Pulsed Source-Drain Diode Forward Current		--	--	24.0	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S=6\text{ A}, V_{GS}=0\text{ V}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$I_S=6\text{ A}, V_{GS}=0\text{ V}$ $diF/dt=100\text{ A}/\mu\text{s}$	--	780	--	ns
Q_{rr}	Reverse Recovery Charge		--	9.0	--	μC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=34\text{ mH}, I_{AS}=6\text{ A}, V_{DD}=50\text{ V}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. $I_{SD}\leq 6\text{ A}, di/dt\leq 200\text{ A}/\mu\text{s}, V_{DD}\leq BV_{DSS}$, 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

MSF6N90

900V N-Channel MOSFET

Characteristics Curve

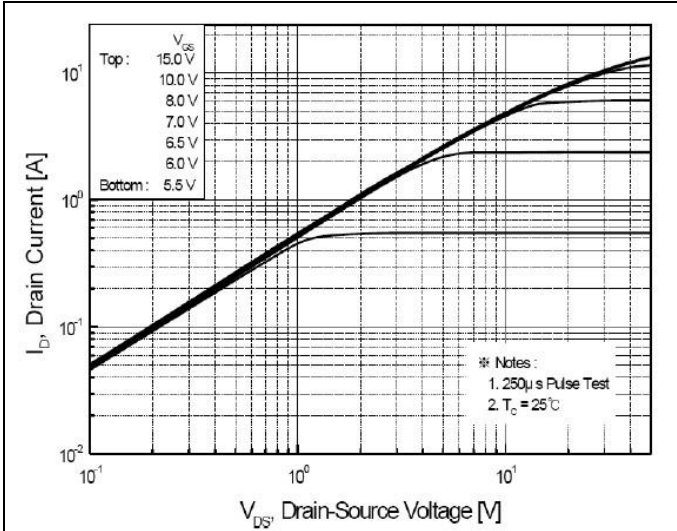


FIG.1-ON REGION CHARACTERISTICS

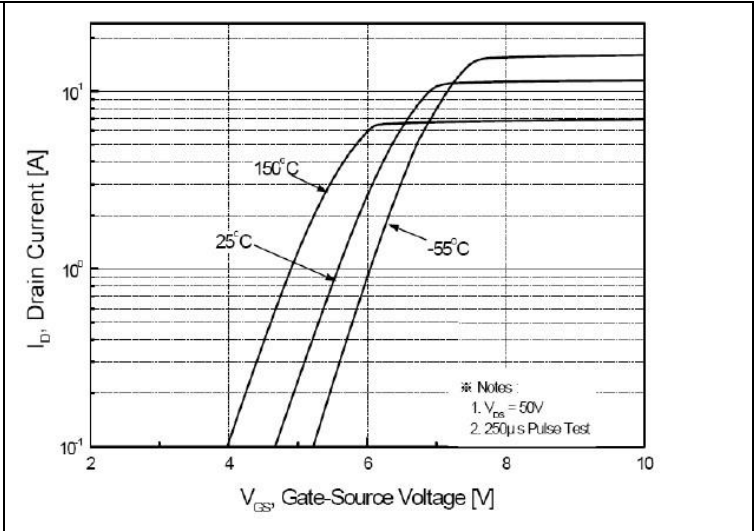


FIG.2-TRANSFER CHARACTERISTICS

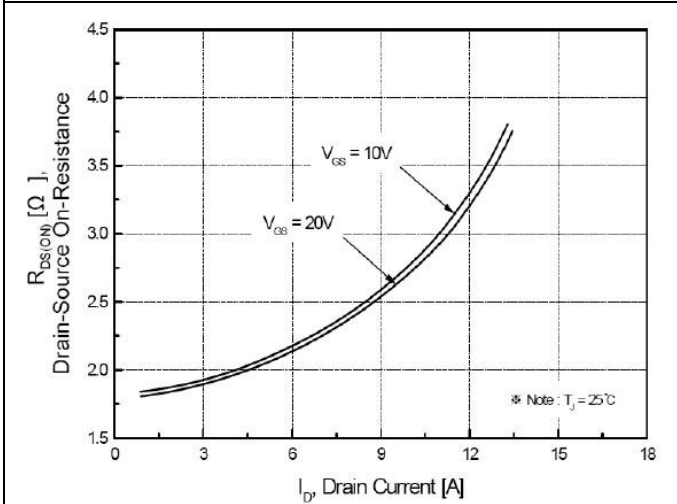


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

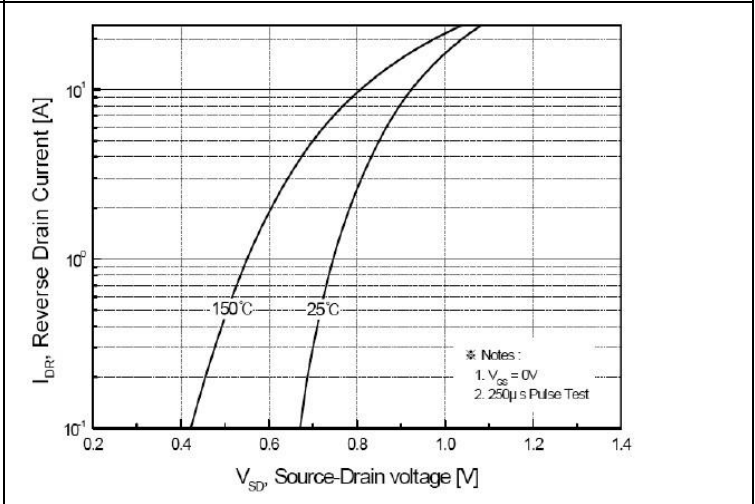


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

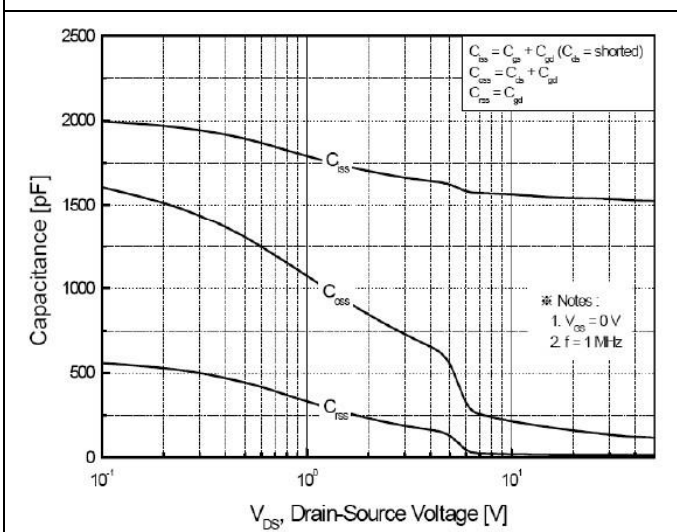


FIG.5-CAPACITANCE CHARACTERISTICS

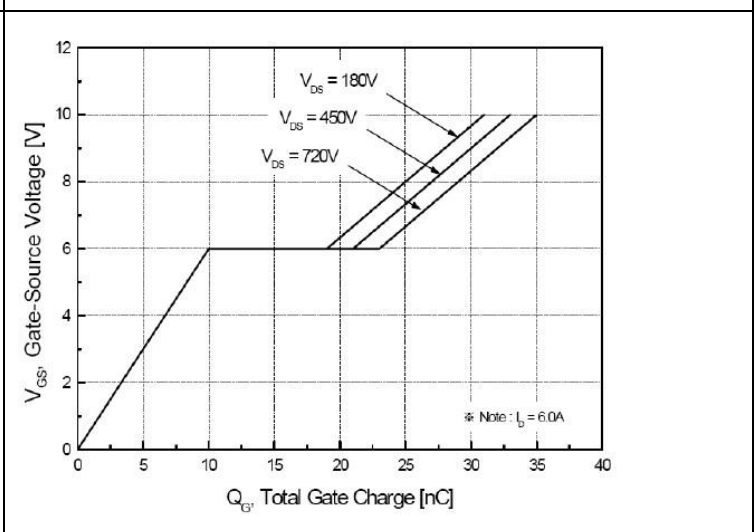


FIG.6-GATE CHARGE CHARACTERISTICS

MSF6N90

900V N-Channel MOSFET

■ Characteristics Curve

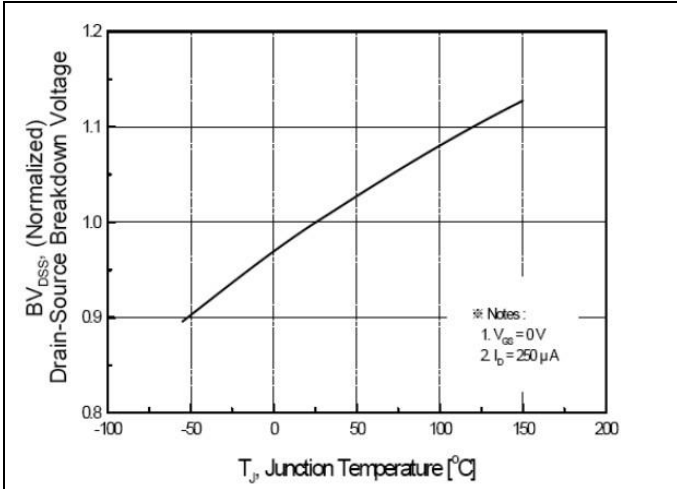


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

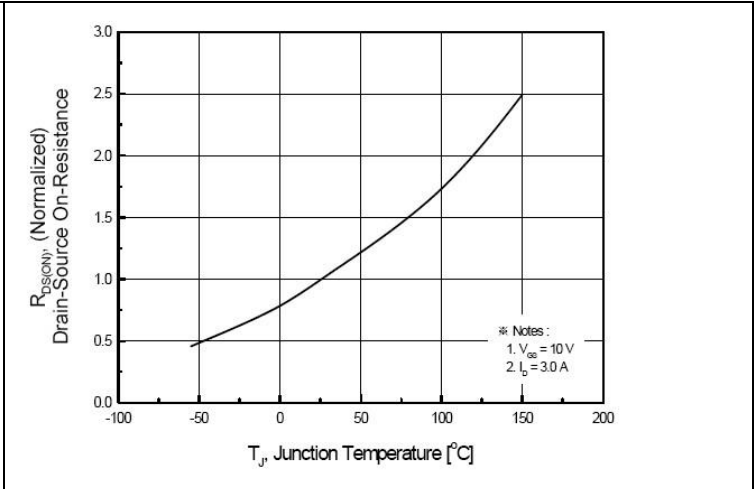


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

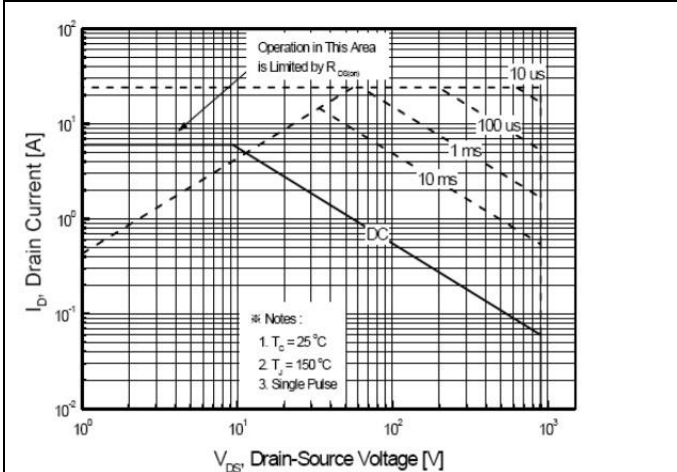


FIG.9-MAXIMUM SAFE OPERATING AREA

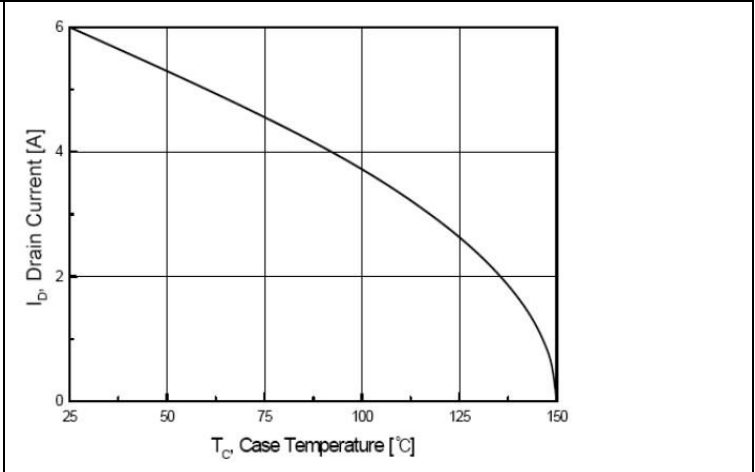


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

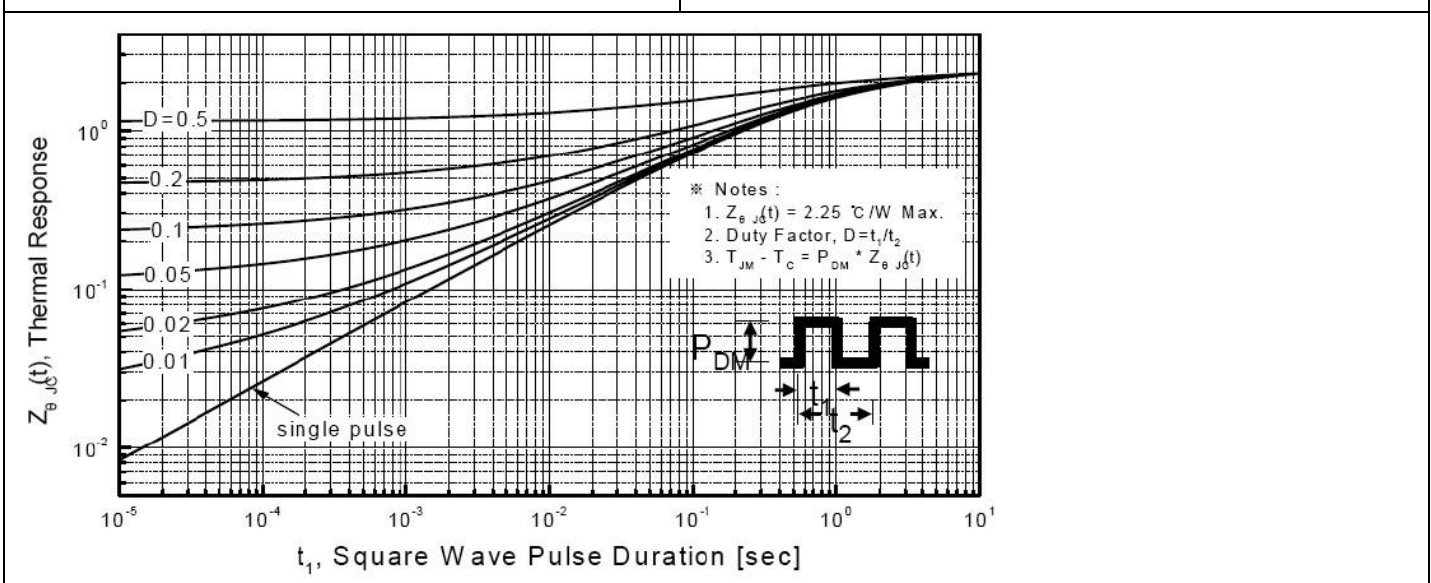


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

MSF6N90

900V N-Channel MOSFET

■ Characteristics Test Circuit & Waveform

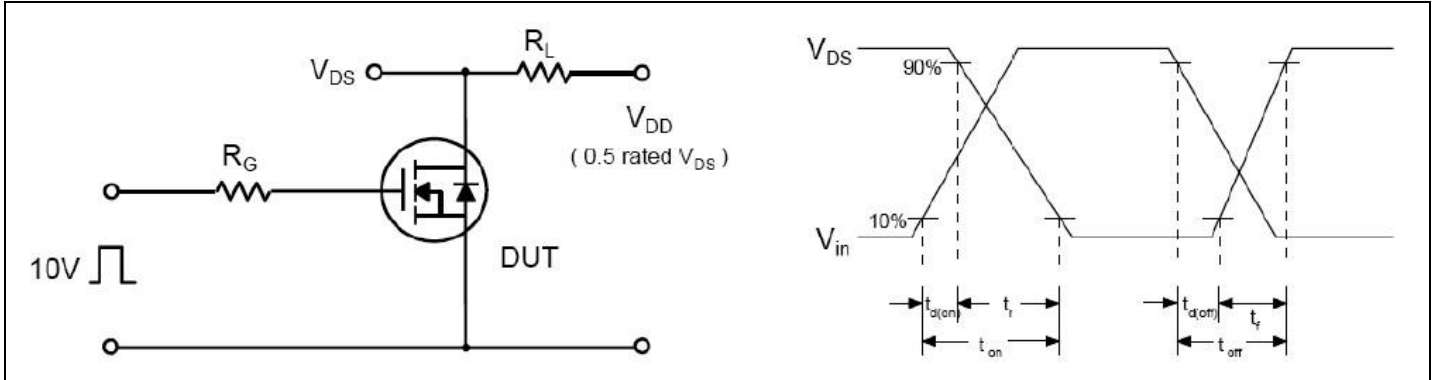


Fig 12. Resistive Switching Test Circuit & Waveforms

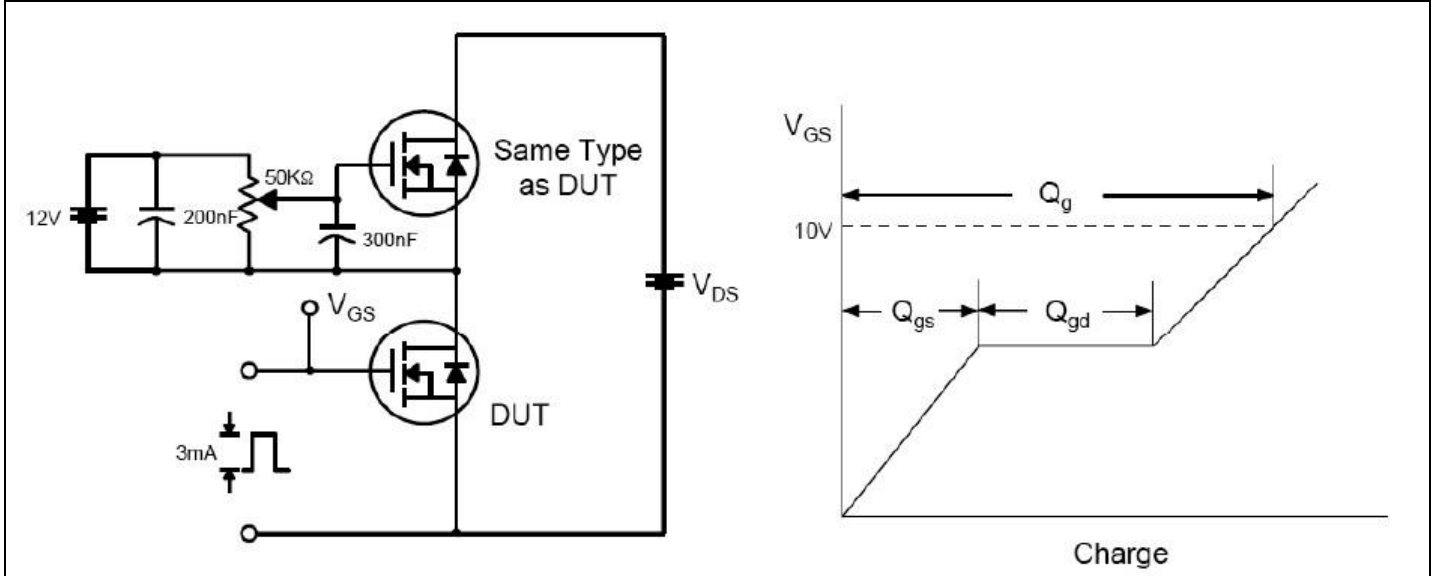


Fig 13. Gate Charge Test Circuit & Waveform

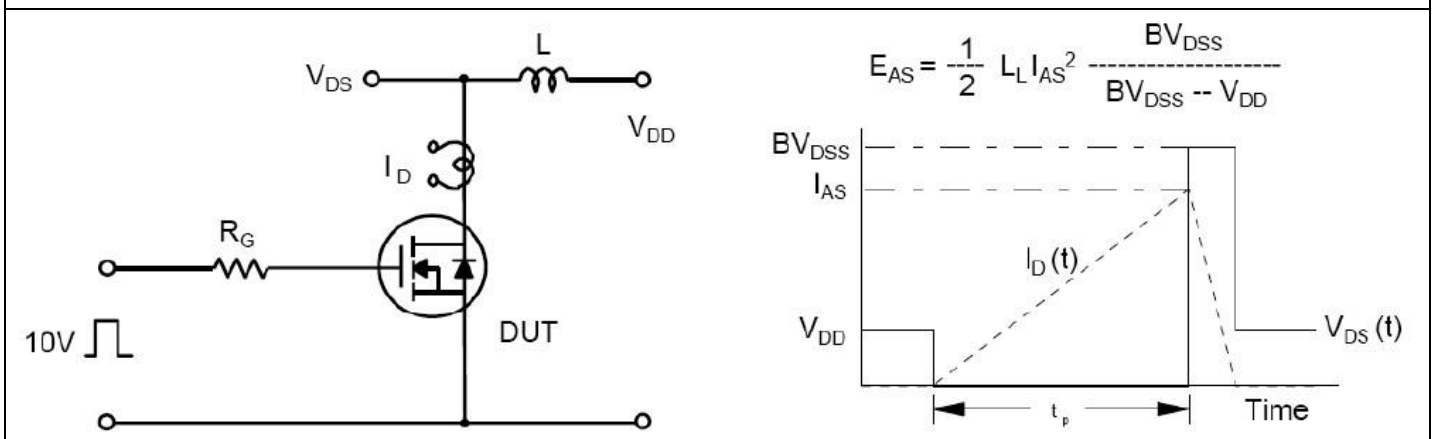


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

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