

# MSF18N50

## 500V N-Channel MOSFET

### Description

The MSF18N50 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-220AB 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

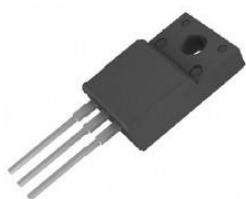
### Application

- High current, High speed switching
- PFC (Power Factor Correction)

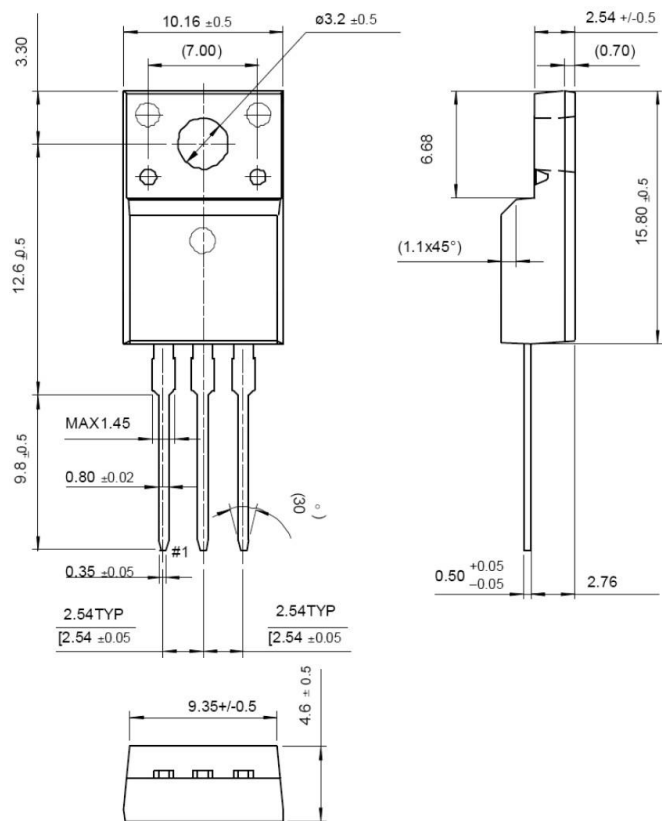
**Package type :** ITO220-AB

### Packing & Order Information

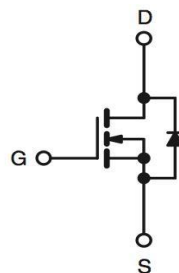
50/Tube ; 1,000/Box



**RoHS  
COMPLIANT**



Graphic symbol



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-Source Voltage	500	V
V <sub>GS</sub>	Gate-Source Voltage	±30	V
I <sub>D</sub>	Drain Current -Continuous (TC=25°C)	18	A
	Drain Current -Continuous (TC=100°C)	10.8	A
I <sub>DM</sub>	Drain Current Pulsed	72	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy	990	mJ
E <sub>AR</sub>	Repetitive Avalanche Energy	23.5	mJ
dV/dt	Peak Diode Recovery dV/dt	4.5	V/ns
P <sub>D</sub>	Power Dissipation (TC = 25 °C)	235	W
	Power Dissipation (TC=100°C)	1.8	W/°C

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

Symbol	Parameter	Value	Unit
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C

NOTE:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

### Thermal characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Max.	Units
R <sub>thjc</sub>	Typical thermal resistance	0.53	°C/W
R <sub>θJA</sub>		62.5	

### Static Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
V <sub>GS</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0		5.0	V
*R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =9.0A	--	0.25	0.32	Ω
BV <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> =250μA	500	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	I <sub>D</sub> =250μA, Referenced to 25°C		0.6		
I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> = 0 V V <sub>DS</sub> =400V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125°C	--	--	1 10	uA
I <sub>GSSF</sub>	V <sub>DS</sub> =30V, V <sub>DS</sub> =0 V			100	nA
I <sub>GSSR</sub>	V <sub>DS</sub> =-30V, V <sub>DS</sub> =0 V	--	--	-100	nA

### Dynamic Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
Q <sub>g</sub>	V <sub>DS</sub> =400V, I <sub>D</sub> =18A, V <sub>GS</sub> =10 V	--	48.5	--	nC
Q <sub>gs</sub>		--	14	--	
Q <sub>gd</sub>		--	22	--	
t <sub>d(on)</sub>	V <sub>DS</sub> =250 V, I <sub>D</sub> =18A, R <sub>G</sub> =25Ω	--	70	--	ns
t <sub>r</sub>		--	190	--	ns
t <sub>d(off)</sub>		--	100	--	ns
t <sub>f</sub>		--	100	--	ns
C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	--	2500	--	pF
C <sub>OSS</sub>		--	400	--	pF
C <sub>RSS</sub>		--	40	--	pF

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#### Source-Drain Diode Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
$I_S$		--	--	18	A
$I_{SM}$		--	--	72	
$V_{SD}$	$I_F=18A, V_{GS}=0$	--	--	1.5	V
$t_{rr}$	$I_F=18A, V_{GS}=0, di/dt=100A/\mu s$	--	550	--	ns
$Q_{rr}$		--	5.5	--	$\mu C$

Notes ;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L=5.5mH, I_{AS}=18A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^\circ C$
3.  $I_{SD} \leq 16A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ C$
4. Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2\%$
5. Essentially Independent of Operating Temperature

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#### ■ Characteristics Curve

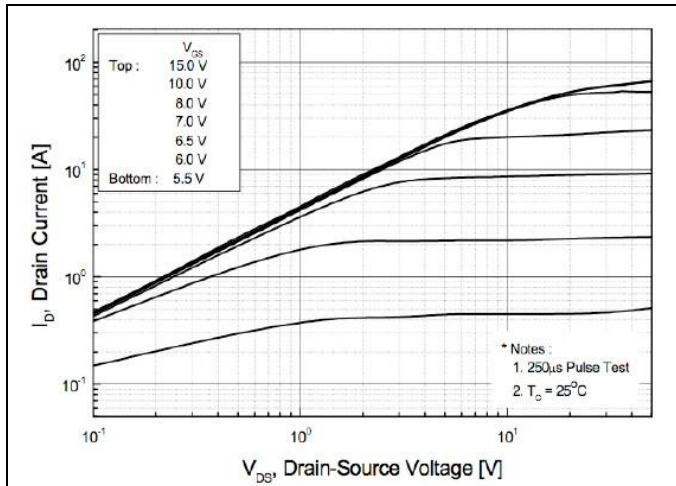


FIG.1 - ON REGION CHARACTERISTICS

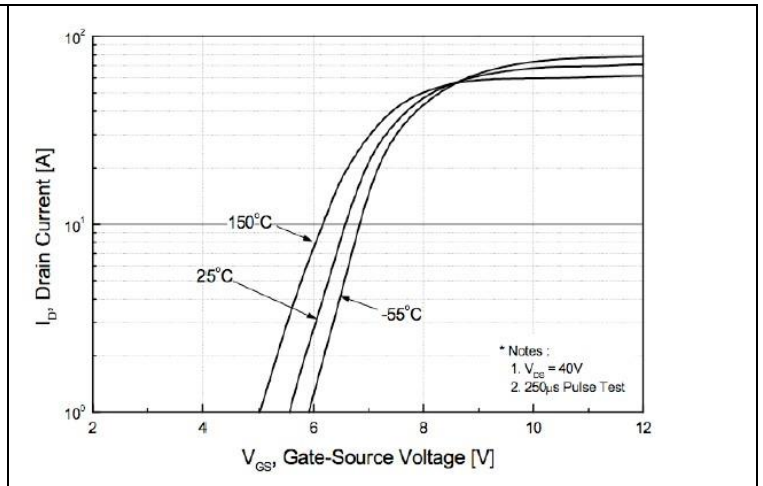


FIG.2 - TRANSFER CHARACTERISTICS

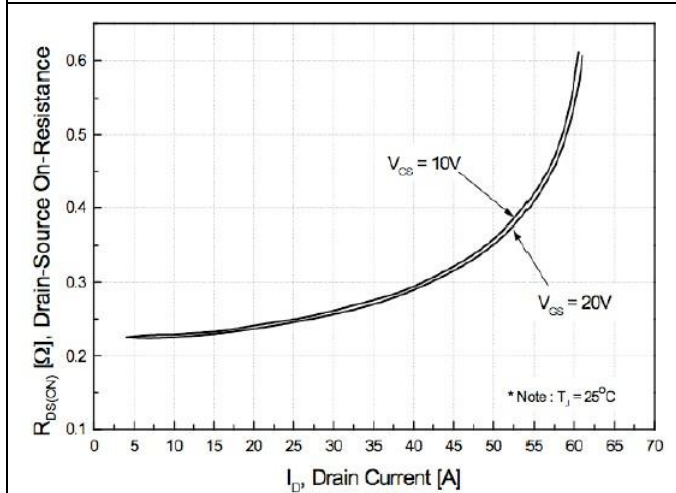


FIG.3 - ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

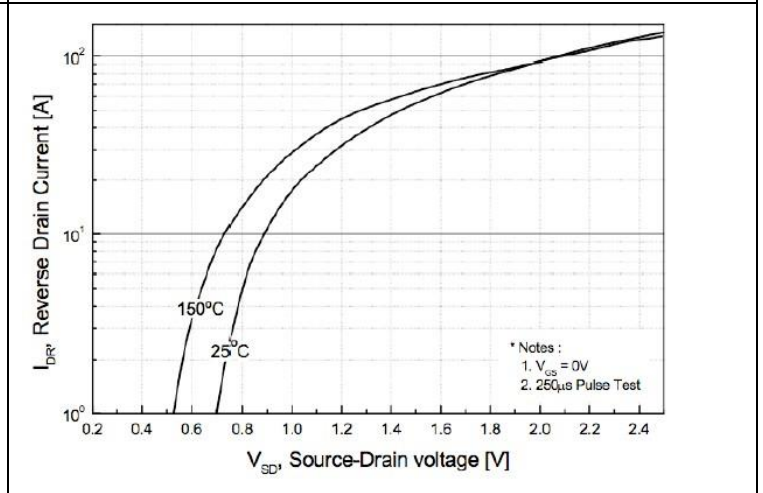


FIG.4 - BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

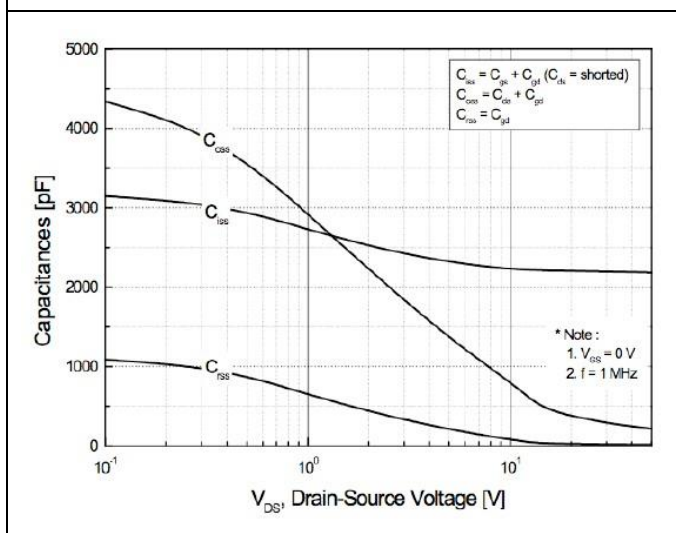


FIG.5 - CAPACITANCE CHARACTERISTICS

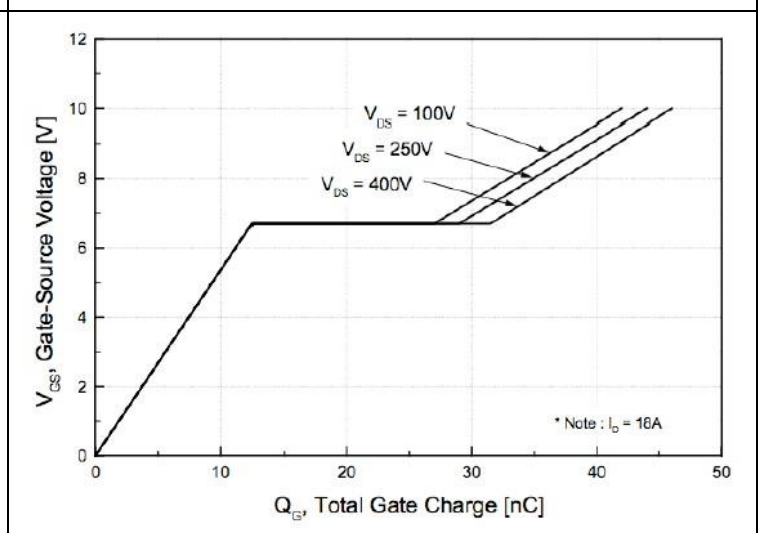
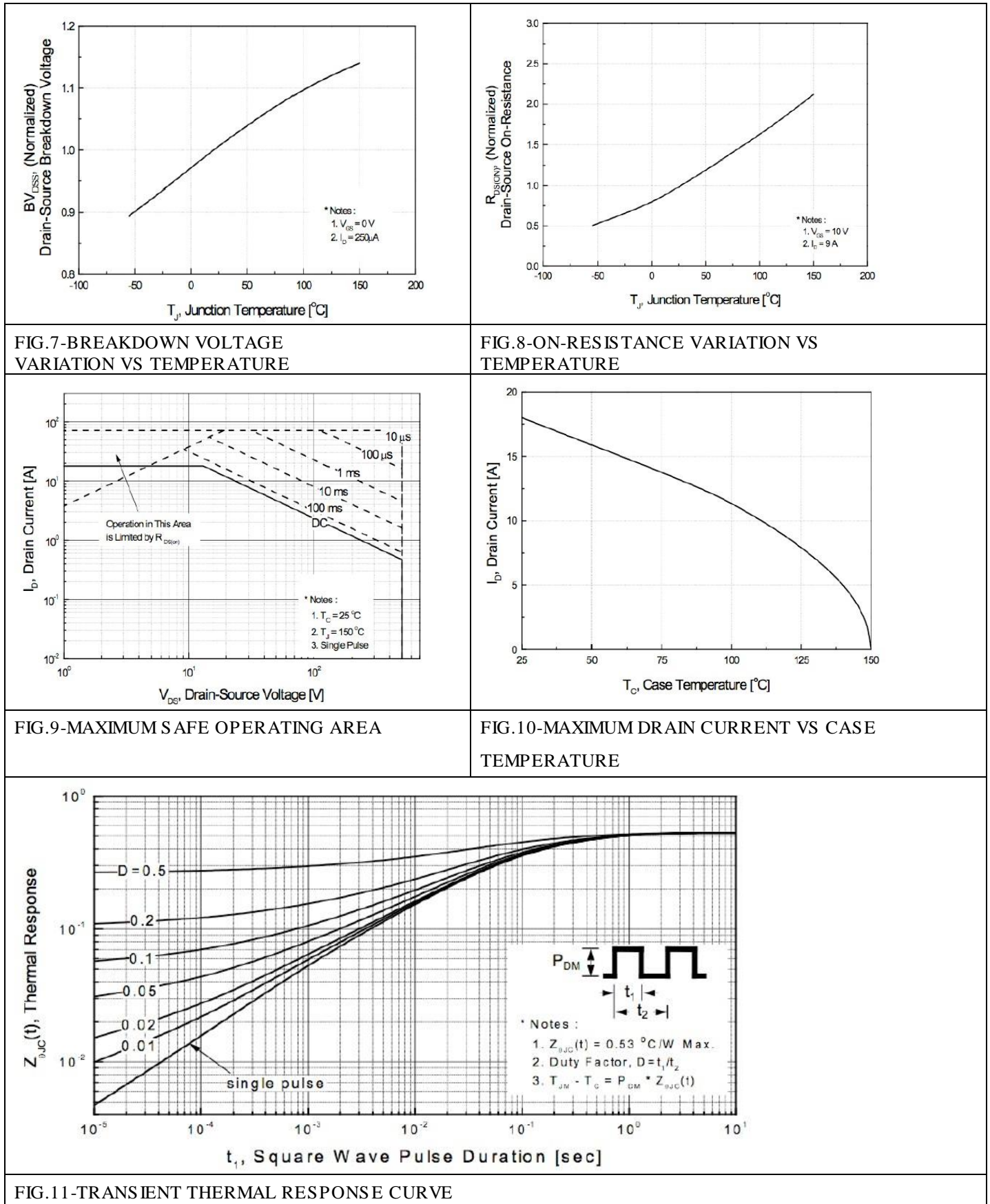


FIG.6 - GATE CHARGE CHARACTERISTICS

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#### ■ Characteristics Curve



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#### ■ Characteristics Test Circuit & Waveform

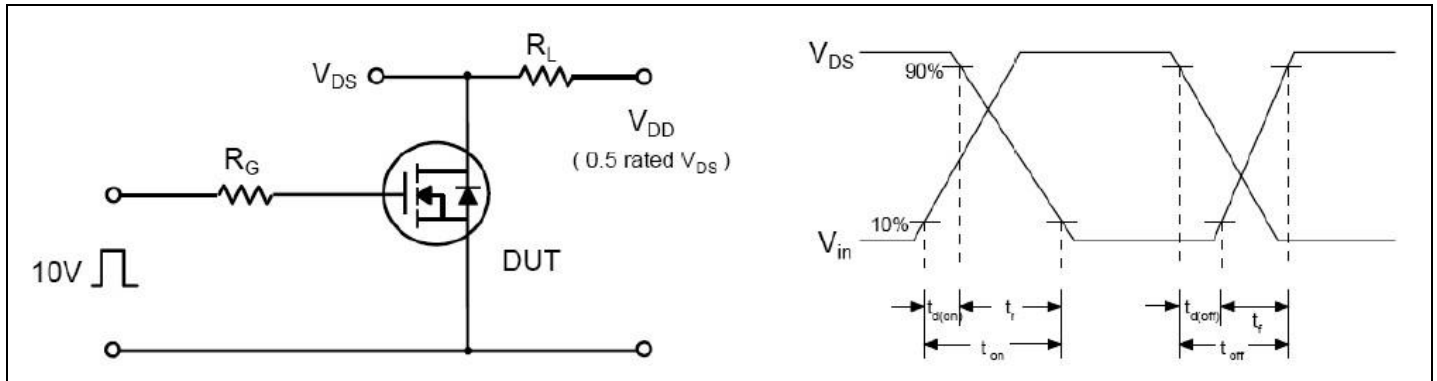


Fig 12. Resistive Switching Test Circuit & Waveforms

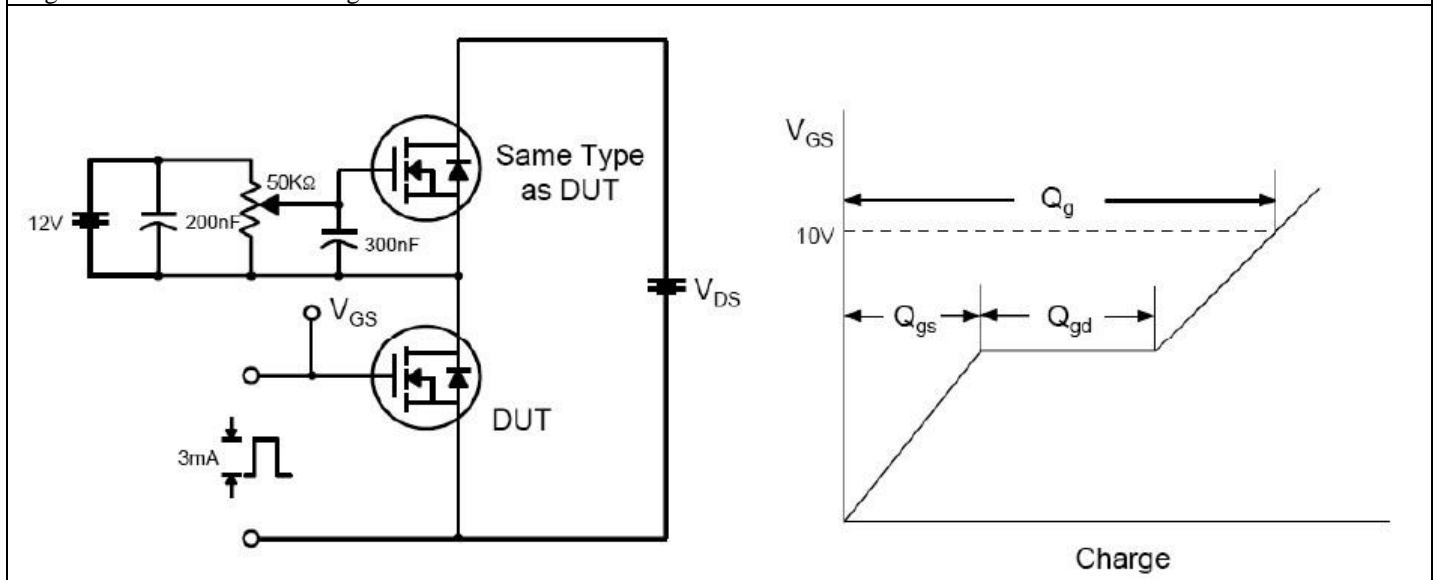


Fig 13. Gate Charge Test Circuit & Waveform

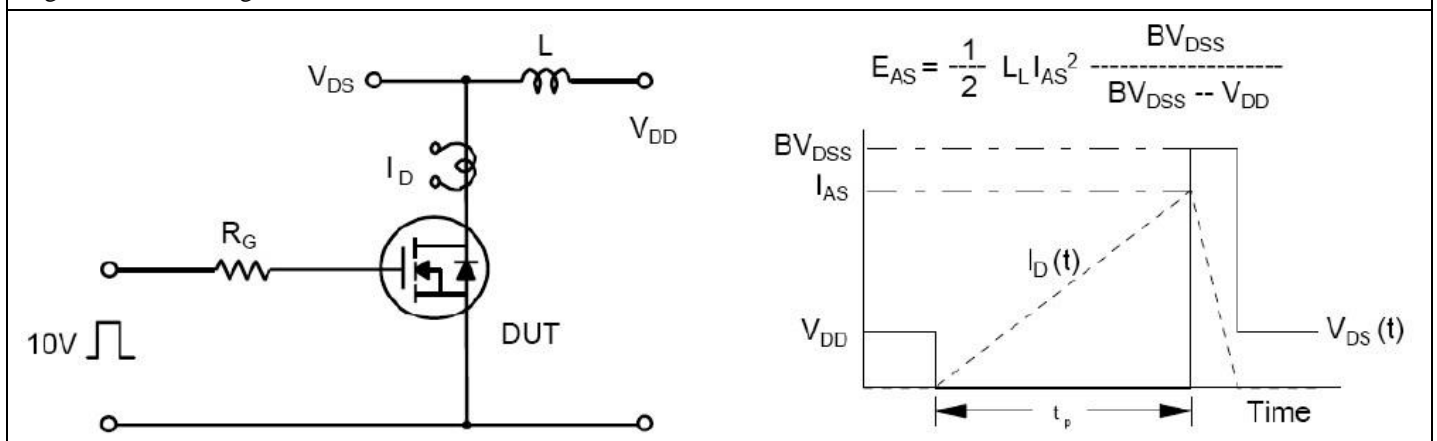


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

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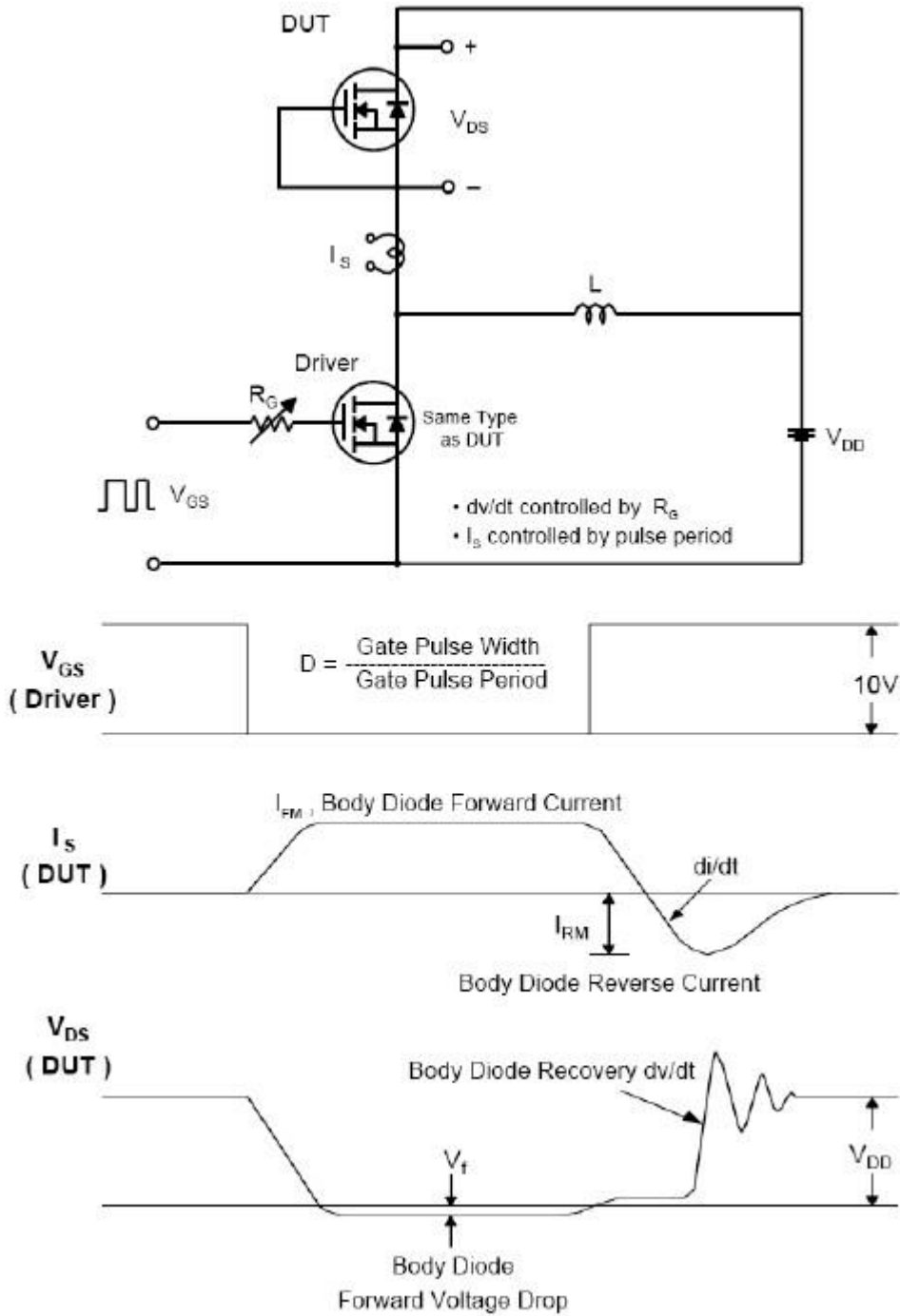


Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

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#### Disclaimer

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