

## MSF7N80

### 800V N-Channel MOSFET

#### Description

The MSF7N80 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-220F package is universally preferred for all commercial-industrial applications

#### Features

- Originative New Design
- Very Low Intrinsic Capacitances
- Excellent Switching Characteristics
- Unrivalled Gate Charge : 37nC (Typ.)
- Extended Safe Operating Area
- RoHS compliant package

#### Application

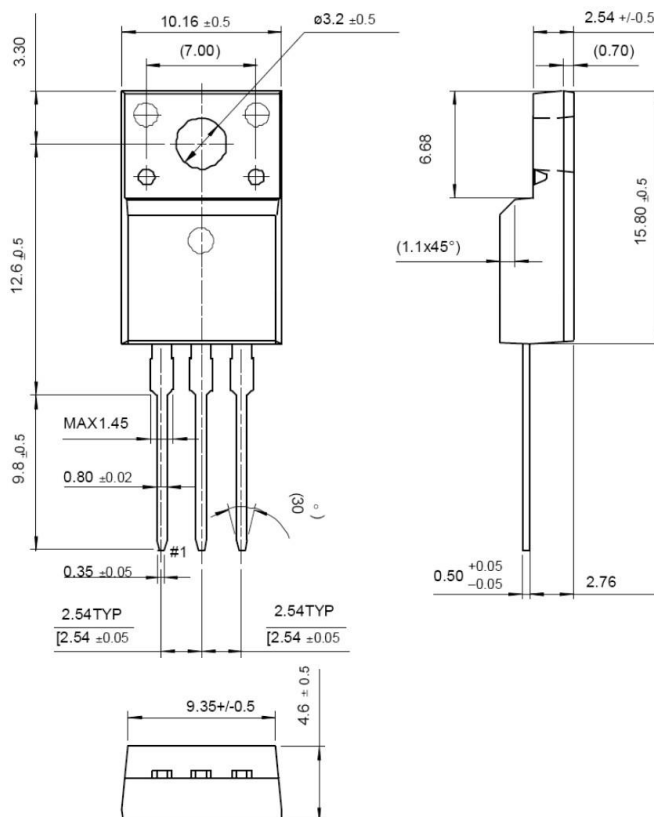
- Open Framed Power Supply
- Adapter
- STB

#### Packing & Order Information

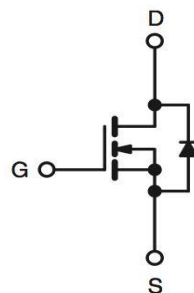
50/Tube ; 1,000/Box



**RoHS**  
COMPLIANT



#### Graphic symbol



### MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

#### Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage	800	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Drain Current -Continuous (TC=25°C)	7.0	A
	Drain Current -Continuous (TC=100°C)	4.2	A
$I_{DM}$	Drain Current Pulsed	28	A
$E_{AS}$	Single Pulsed Avalanche Energy	580	mJ
$E_{AR}$	Repetitive Avalanche Energy	16.7	mJ

## MSF7N80

### 800V N-Channel MOSFET

#### Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
dv/dt	Peak Diode Recovery dv/dt	5.5	V/ns
P <sub>D</sub>	Total Power Dissipation (TC = 25 °C)	56	W
	Derating Factor above 25 °C	0.42	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C
T <sub>L</sub>	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

- Drain current limited by maximum junction temperature

#### Thermal characteristics

Symbol	Parameter	Max.	Units
R <sub>θJC</sub>	Junction-to-Case	2.25	°C/W
R <sub>θJA</sub>	Junction-to-Ambient	62.5	

#### On 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	2.5	--	4.5	V
*R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.5 A	--	1.4	1.9	Ω

#### Off Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
BV <sub>DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250μA	800	--	--	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> = 250μA, Referenced to 25°C	--	0.6	--	V/°C
I <sub>DSS</sub>	V <sub>DS</sub> = 800 V, V <sub>GS</sub> = 0 V V <sub>DS</sub> = 640 V, V <sub>C</sub> = 125°C	--	--	10 100	μA
I <sub>GSSF</sub>	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V	--	--	100	nA
I <sub>GSSR</sub>	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V	--	--	-100	nA

#### Switching Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
Q <sub>g</sub>	V <sub>DG</sub> = 640 V, I <sub>D</sub> = 10 A, V <sub>GS</sub> = 7 V	--	35	--	nC
Q <sub>gs</sub>		--	11	--	nC
Q <sub>gd</sub>		--	15	--	nC
t <sub>d(on)</sub>	V <sub>DS</sub> = 400 V, I <sub>D</sub> = 7 A, R <sub>G</sub> = 25 Ω	--	40	--	ns
t <sub>r</sub>		--	120	--	ns
t <sub>d(off)</sub>		--	60	--	ns
t <sub>f</sub>		--	70	--	ns

## MSF7N80

800V N-Channel MOSFET

### Dynamic Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
$C_{ISS}$	$V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{MHz}$	--	1500	2010	pF
$C_{OSS}$		--	145	190	pF
$C_{RSS}$		--	13	20	pF

### Source-Drain Diode Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
$I_S$		--	--	7	A
$I_{SM}$		--	--	28	
$V_{SD}$	$I_S = 7\text{ A}$ , $V_{GS} = 0\text{ V}$	--	--	1.4	V
$t_{rr}$	$I_F = 7\text{ A}$ , $V_{GS} = 0\text{ V}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	--	650	--	ns
$Q_{rr}$		--	8	--	$\mu\text{C}$

#### Notes:

1. Repeativity rating : pulse width limited by junction temperature
2.  $L = 18.0\text{mH}$ ,  $I_{AS} = 7.0\text{A}$ ,  $V_{DD} = 5\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 7.0\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BVDSS$ , 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.

## MSF7N80

### 800V N-Channel MOSFET

#### ■ Characteristics Curve

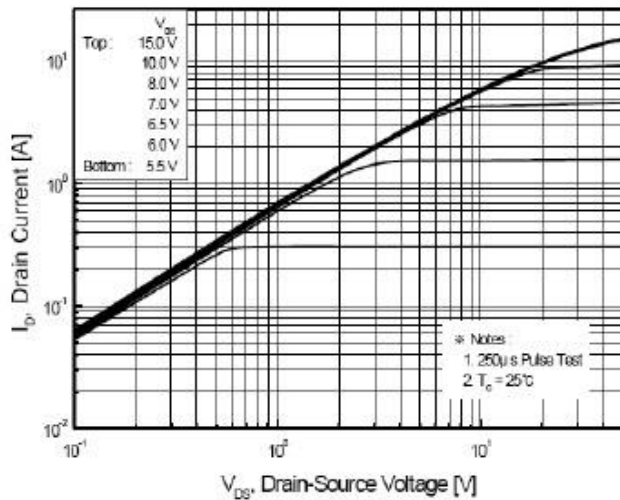


FIG.1-ON REGION CHARACTERISTICS

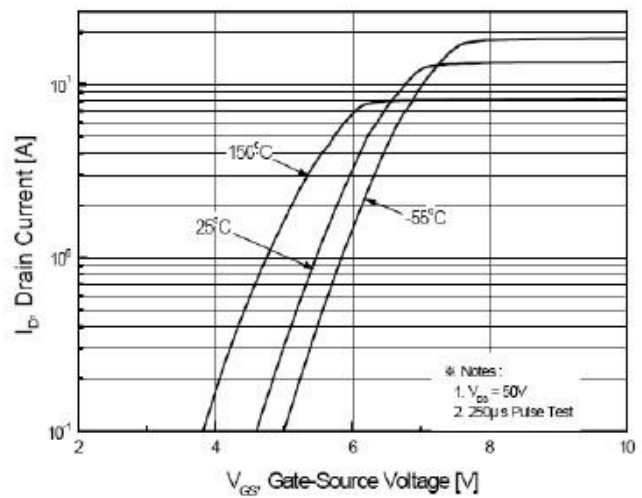


FIG.2-TRANSFER CHARACTERISTICS

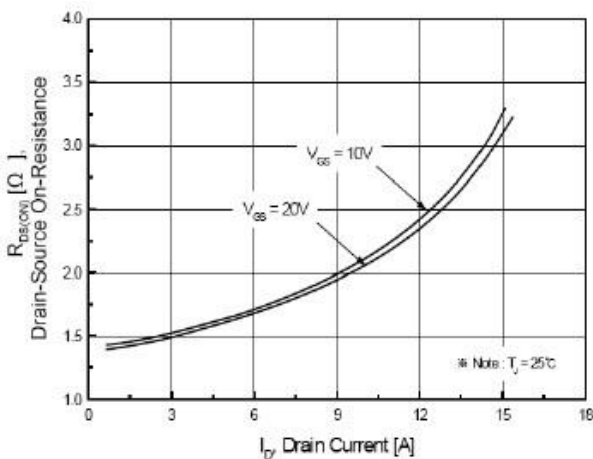


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

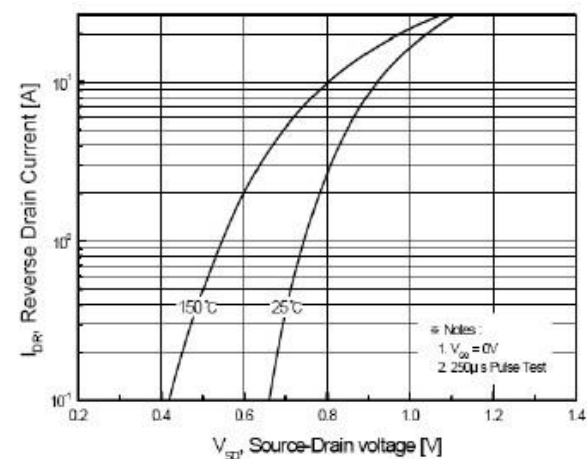


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

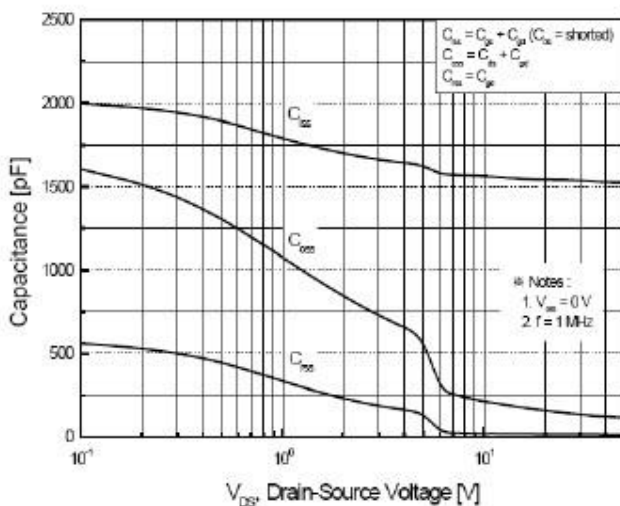


FIG.5-CAPACITANCE CHARACTERISTICS

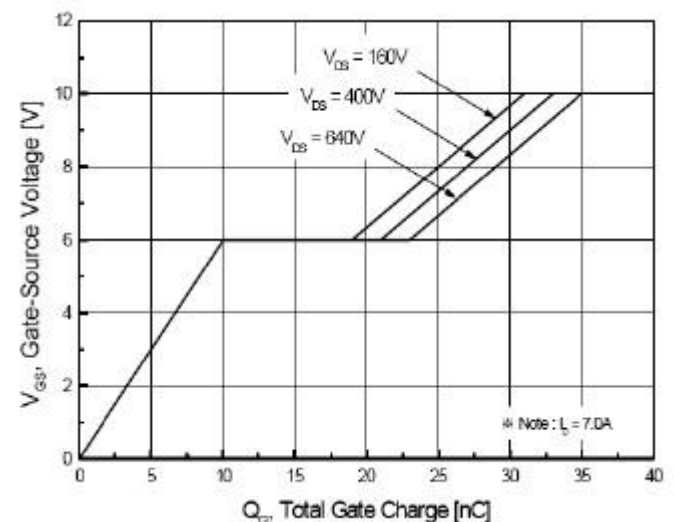
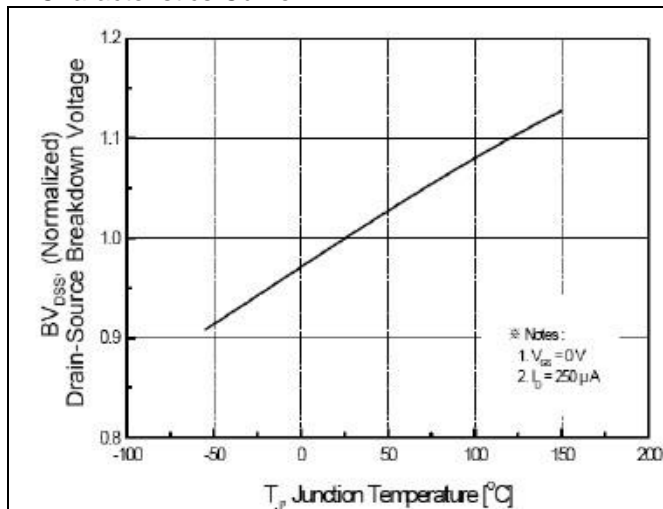


FIG.6-GATE CHARGE CHARACTERISTICS

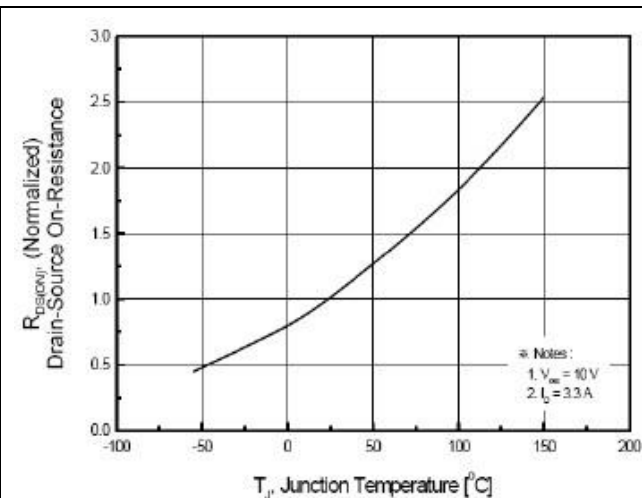
## MSF7N80

### 800V N-Channel MOSFET

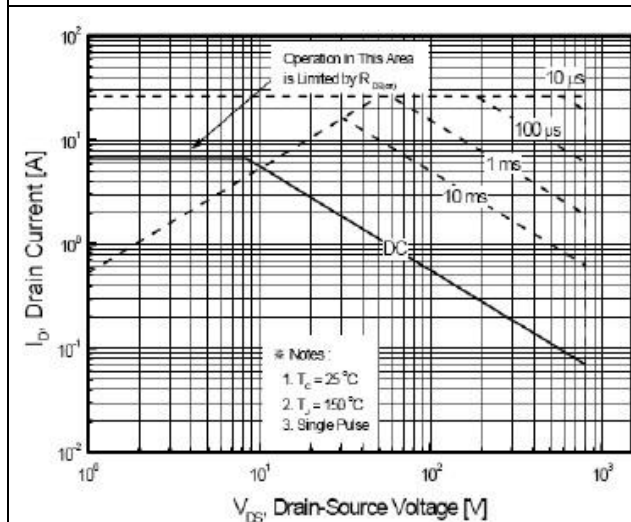
#### ■ Characteristics Curve



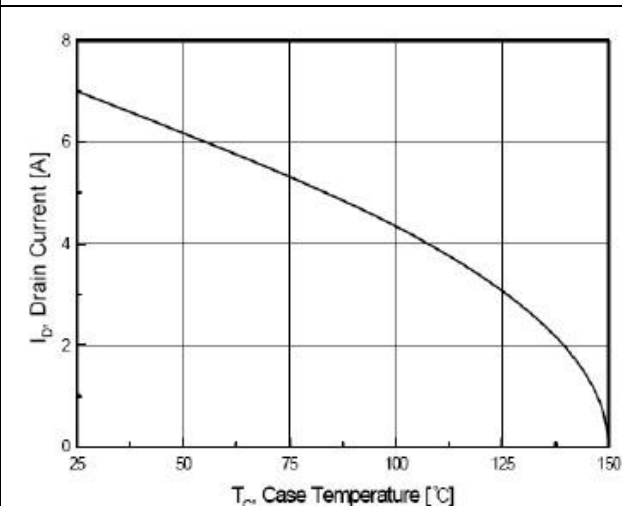
**FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE**



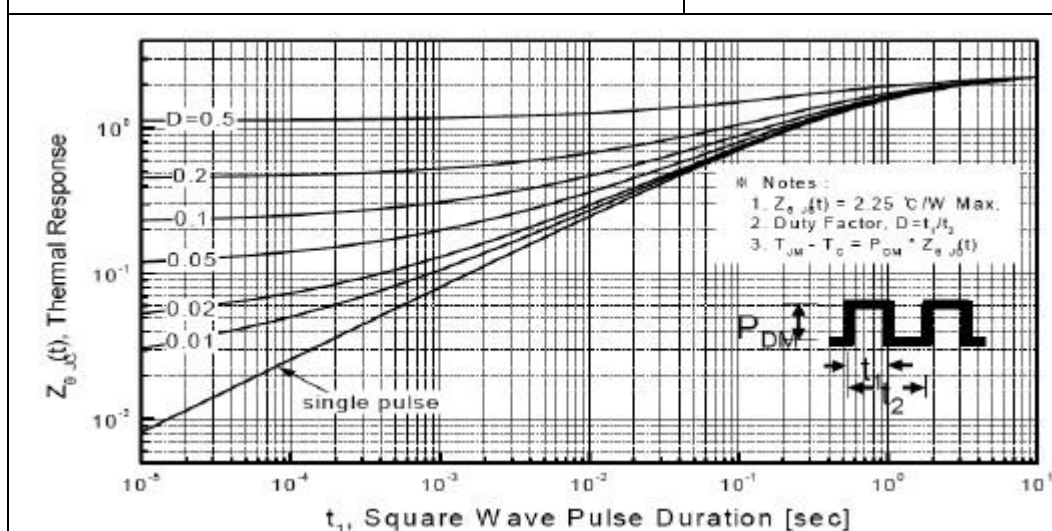
**FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE**



**FIG.9-MAXIMUM SAFE OPERATING AREA**



**FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE**

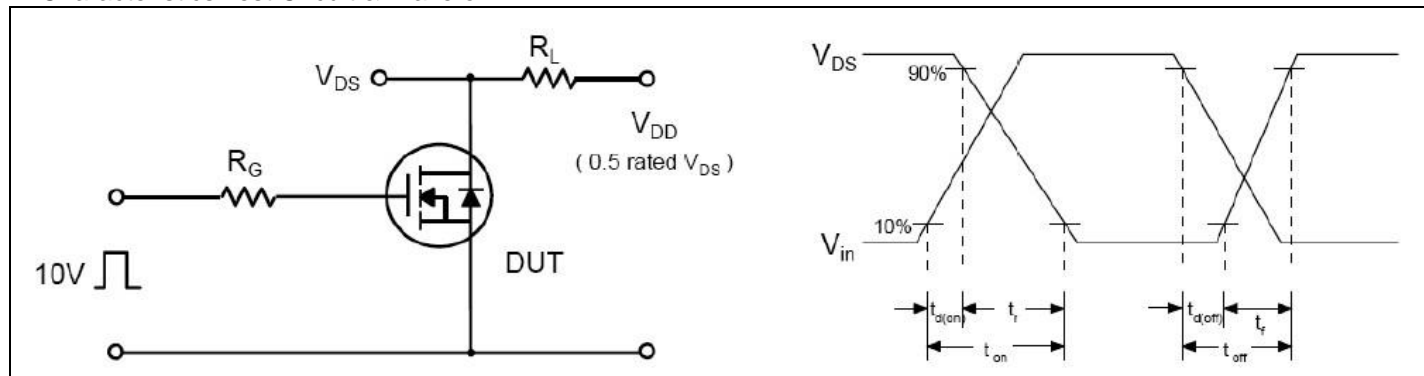


**FIG.11-TRANSIENT THERMAL RESPONSE CURVE**

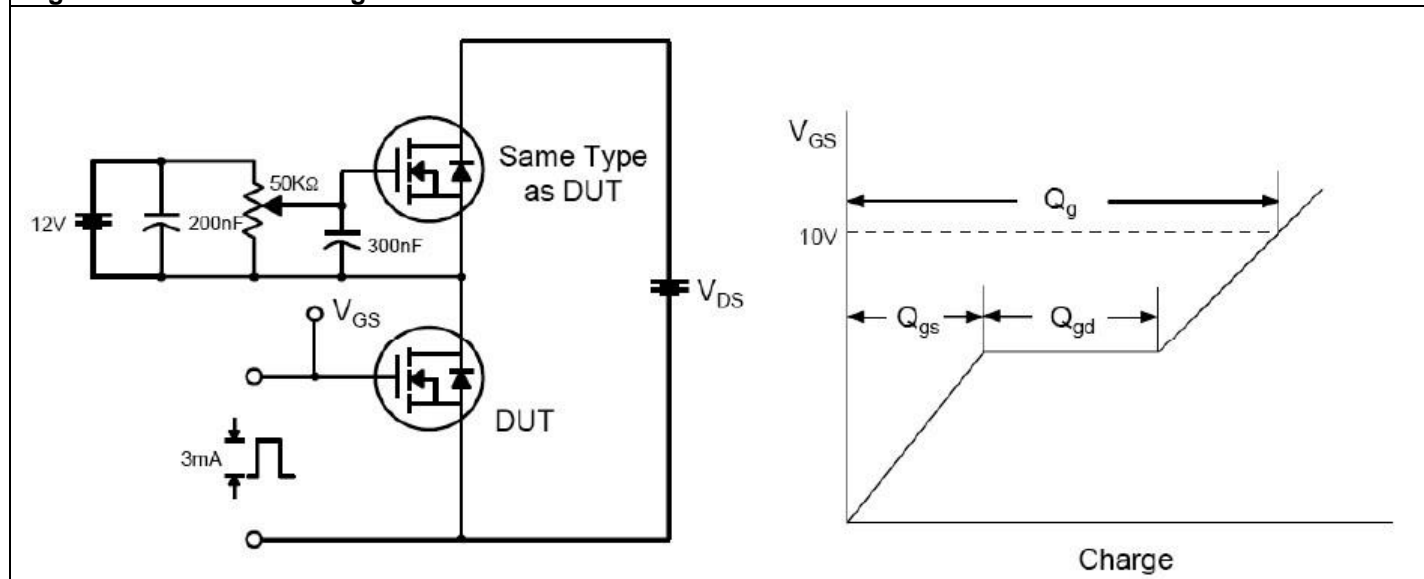
## MSF7N80

### 800V N-Channel MOSFET

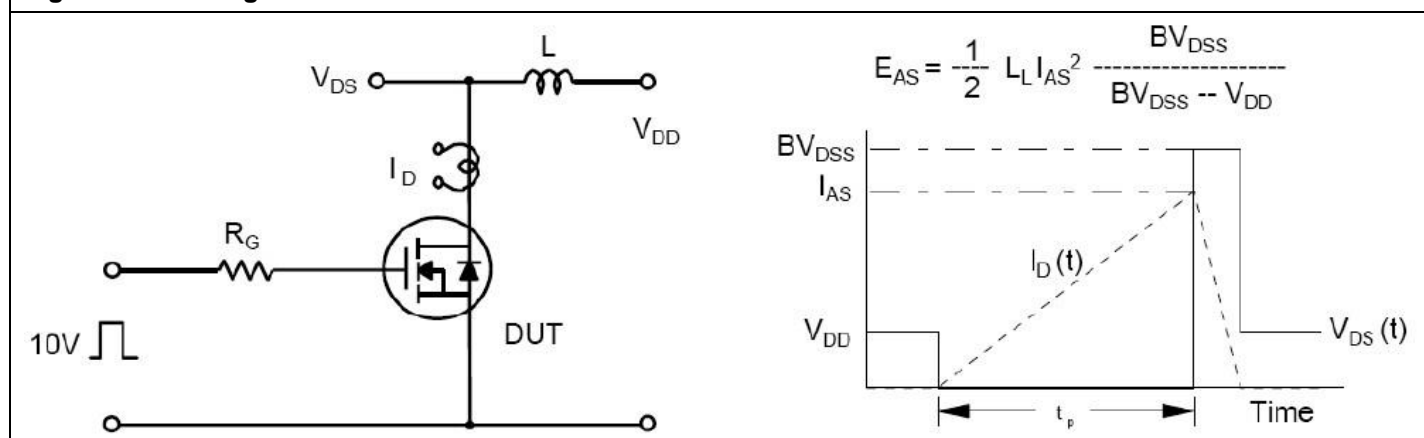
#### ■ Characteristics Test Circuit & Waveform



**Fig 12. Resistive Switching Test Circuit & Waveforms**



**Fig 13. Gate Charge Test Circuit & Waveform**



**Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms**



## MSF7N80

800V N-Channel MOSFET

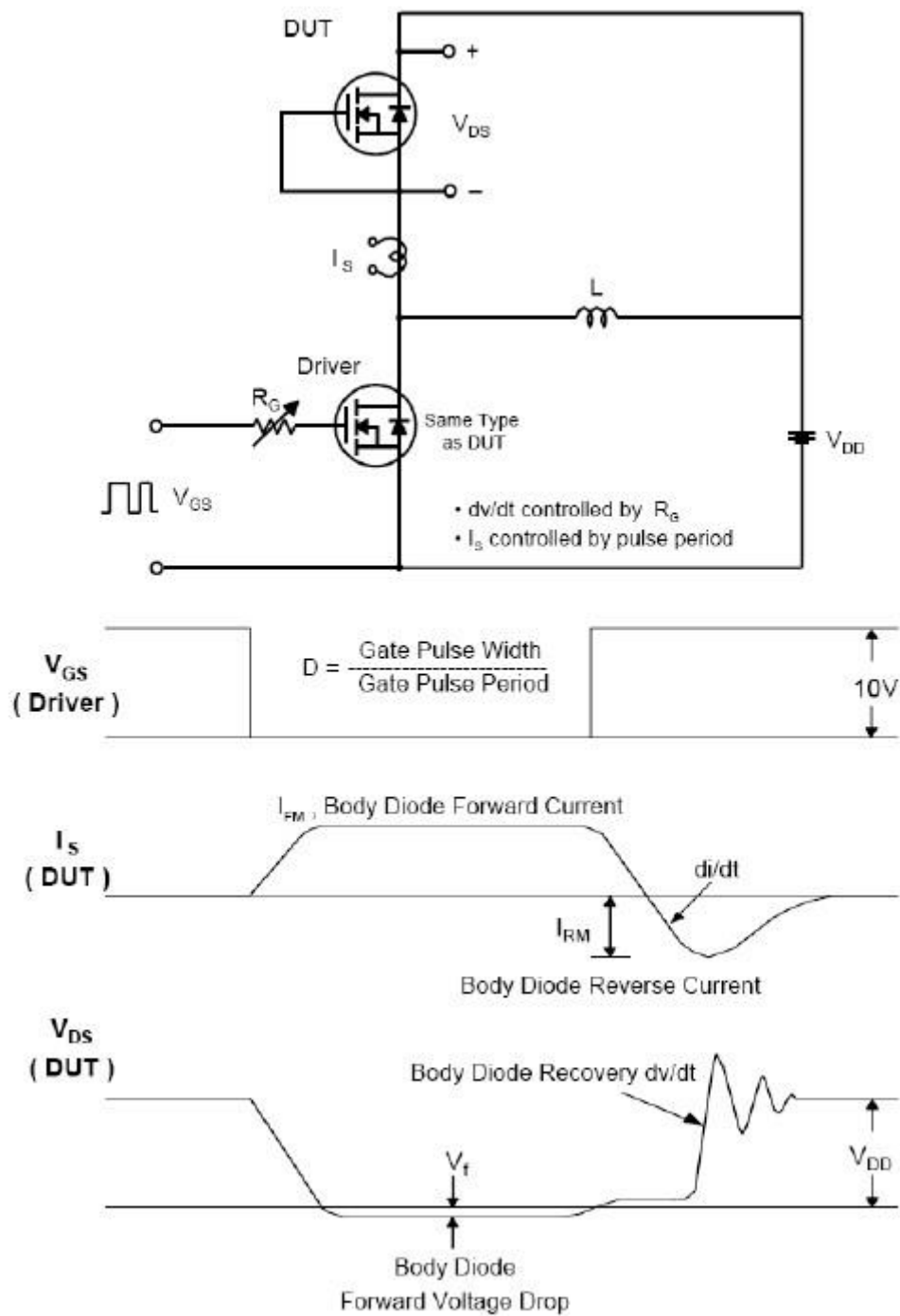


Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

## MSF7N80

### 800V N-Channel MOSFET

#### Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Bruckewell Technology Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Bruckewell"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product. Bruckewell makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Bruckewell disclaims

- (i) Any and all liability arising out of the application or use of any product.
- (ii) Any and all liability, including without limitation special, consequential or incidental damages.
- (iii) Any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Bruckewell's knowledge of typical requirements that are often placed on Bruckewell products in generic applications.

Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time.

Product specifications do not expand or otherwise modify Bruckewell's terms and conditions of purchase, including but not limited to the warranty expressed therein.