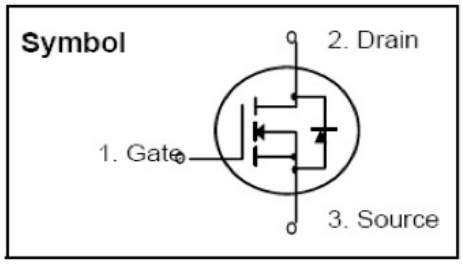
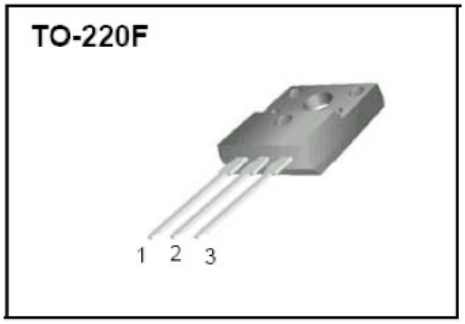
MSF10N80A
800V N-Channel MOSFET





FEATURES

Originative New Design

Very Low Intrinsic Capacitances

Excellent Switching Characteristics

Unrivalled Gate Charge : 46nC (Typ.)

Extended Safe Operating Area

Lower $R_{DS(ON)}$: 1.05 Ω (Typ.) @V_{GS}=10V

100% Avalanche Tested

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

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	800	V
I_D	Drain Current -Continuous (T_C=25°C)	10	A
	Drain Current -Continuous (T_C=100°C)	6	A
I_{DM}	Drain Current -Pulsed	40	A
V_{GS}	Gate-Source Voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy	900	mJ
I_{AR}	Avalanche Current	9	A
E_{AR}	Repetitive Avalanche Energy	24	mJ
d_v/d_t	Peak Diode Recovery dv/dt	4.0	V/ns
P_D	Power Dissipation (T_C=25°C)	60	W
	- Derate above 25°C	0.48	W/°C
T_J,T_{STG}	Operating and Storage Temperature Range	–55 to + 150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

• Drain current limited by maximum junction temperature

Thermal Resistance Characteristics				
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	4.0	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	62.5	

Electrical Characteristics (Tc=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Type	Max	Units
On Characteristics						
V_{GS}	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	3.0	—	5.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V,I_D=4.5A	—	1.05	1.4	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0 V , I_D=250μA	800	—	—	V
$\triangle BV_{DSS}$ /$\triangle T_J$	Breakdown Voltage Temperature Coefficient	I_D=250μA, Referenced to 25°C	—	1.0	—	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=800V , V_{GS}= 0 V	—	—	10	μA
		V_{DS}=640V , V_C= 125°C	—	—	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS}=30V , V_{DS}=0 V	—	—	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS}=-30V , V_{DS}=0 V	—	—	–100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	—	2200	—	pF
C_{oss}	Output Capacitance		—	180	—	pF
C_{rss}	Reverse Transfer Capacitance		—	15	—	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DS}=400 V, I_D=10A, R_G=25Ω	—	60	--	ns
t_r	Turn-On Rise Time		—	130	--	ns
$t_{d(off)}$	Turn-Off Delay Time		—	110	--	ns
tf	Turn-Off Fall Time		—	90	--	ns
Q_g	Total Gate Charge	V_{DS}=640V,I_D=10A, V_{GS}=10 V	—	46	--	nC
Q_{gs}	Gate-Source Charge		—	15	—	nC
Q_{gd}	Gate-Drain Charge		—	20	—	nC

Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		—	—	10	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		—	—	40.0	
V_{SD}	Source-Drain Diode Forward Voltage	I_S=10A, V_{GS}=0V	—	—	1.5	V
trr	Reverse Recovery Time	I_S=10 A , V_{GS}= 0V	—	730	—	ns
Qrr	Reverse Recovery Charge	di_F/dt=100A/μs	—	12	—	μC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=18mH, I_{AS}=10A, V_{DD}=5V, R_G=25Ω, Starting T_J=25°C
3. I_{SD}≦10A, di/dt≦200A/μs, V_{DD}≦BV_{DSS}, Starting T_J=25℃
4. Pulse Test: Pulse Width ≦ 300μs, Duty Cycle≦ 2%
5. Essentially Independent of Operating Temperature

- **Characteristic Curves**

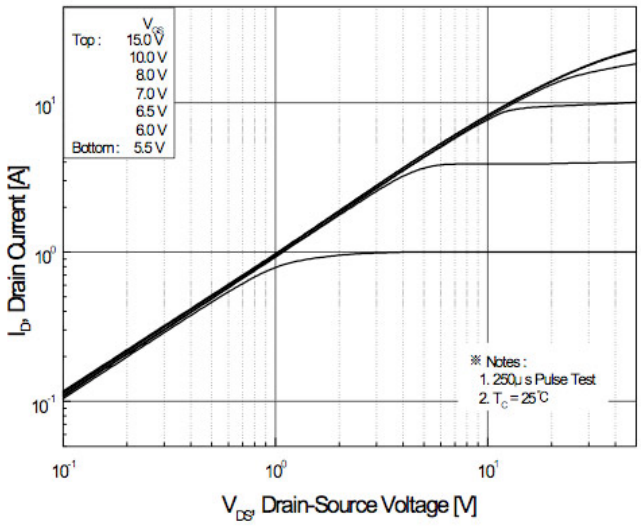


Figure 1. On Region Characteristics

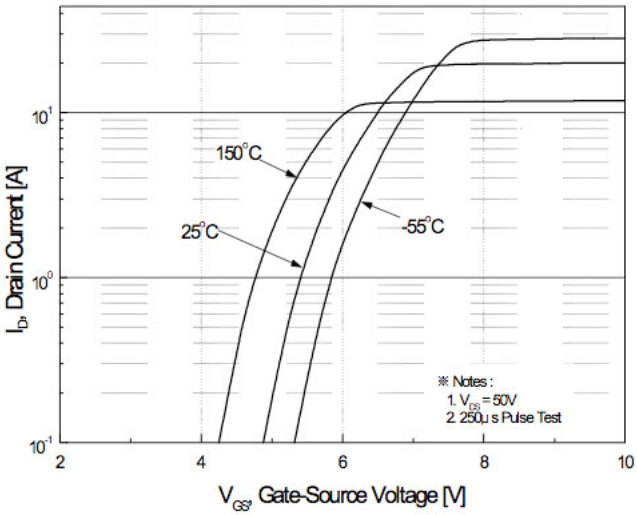


Figure 2. Transfer Characteristics

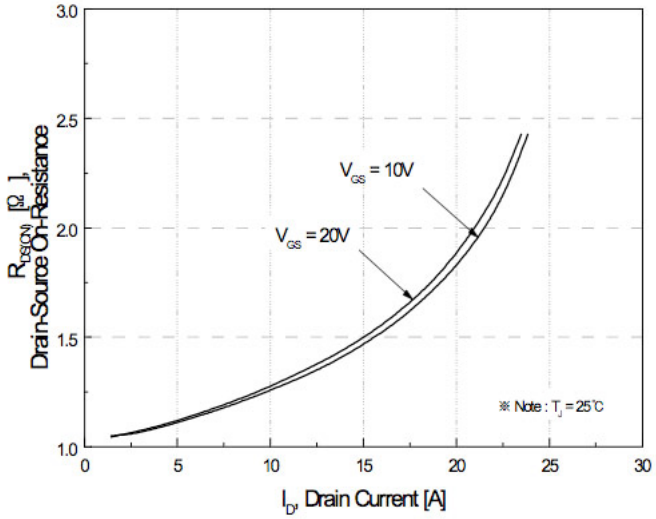


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

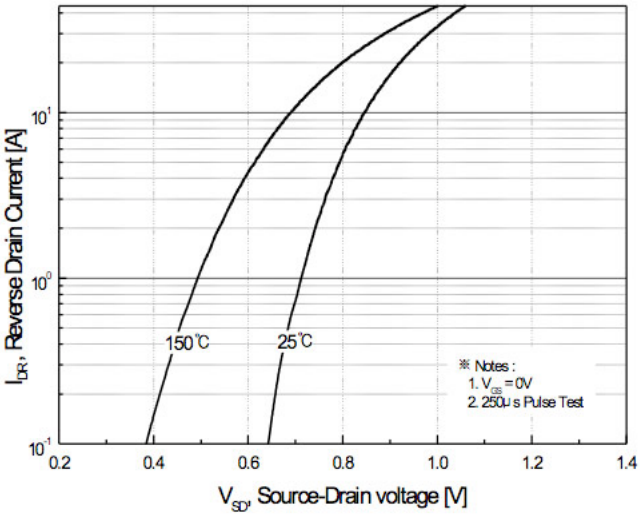


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

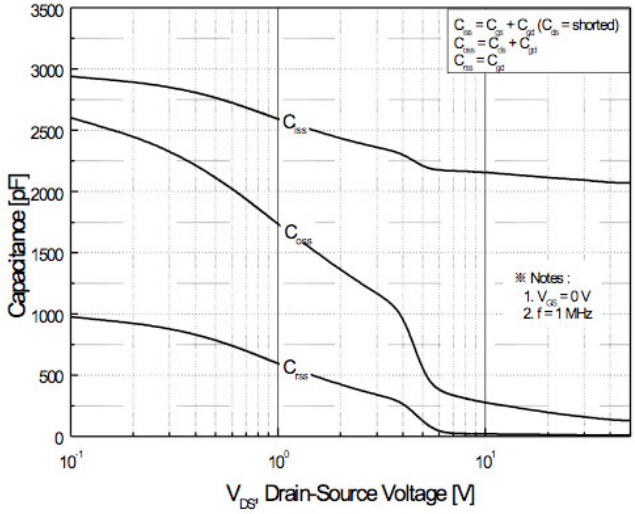


Figure 5. Capacitance Characteristics

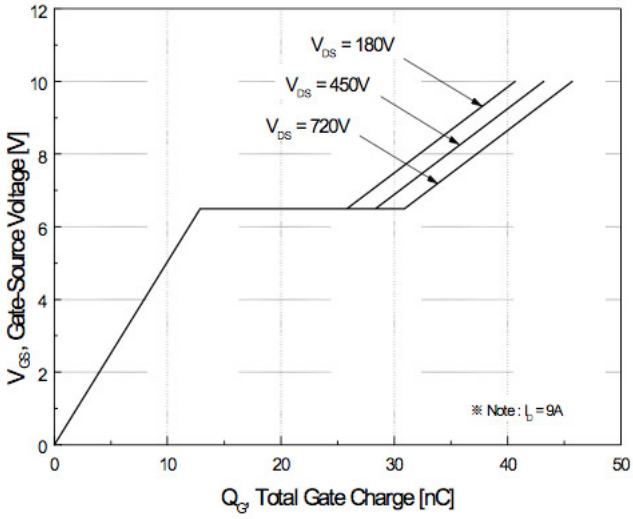


Figure 6. Gate Charge Characteristics

- **Characteristic Curves**

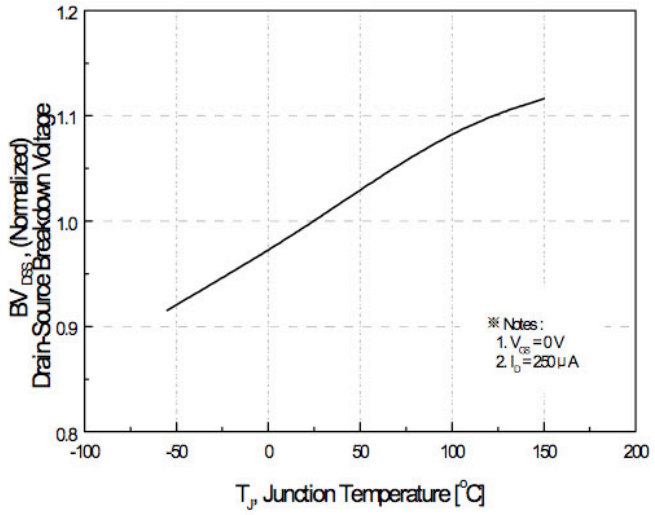


Figure 7. Breakdown Voltage Variation vs. Temperature

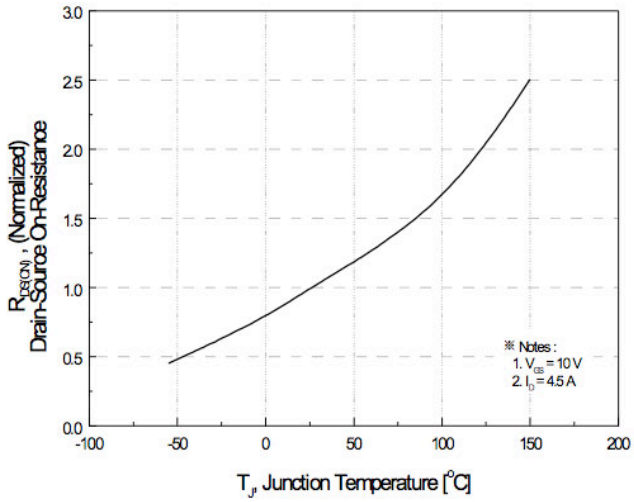


Figure 8. On-Resistance Variation vs. Temperature

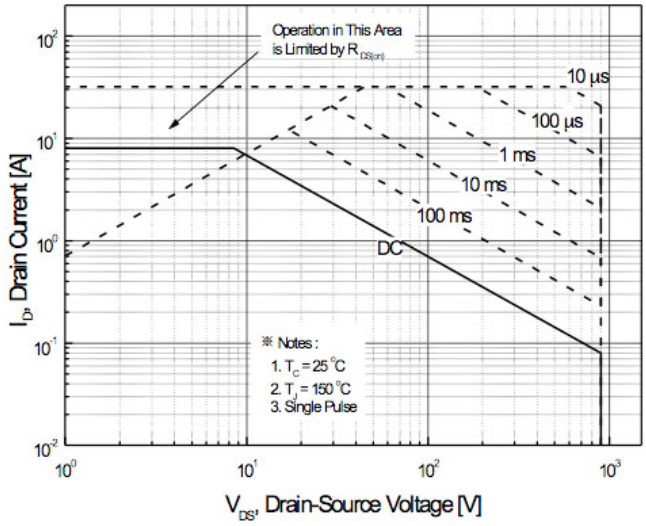


Figure 9. Maximum Safe Operating Area

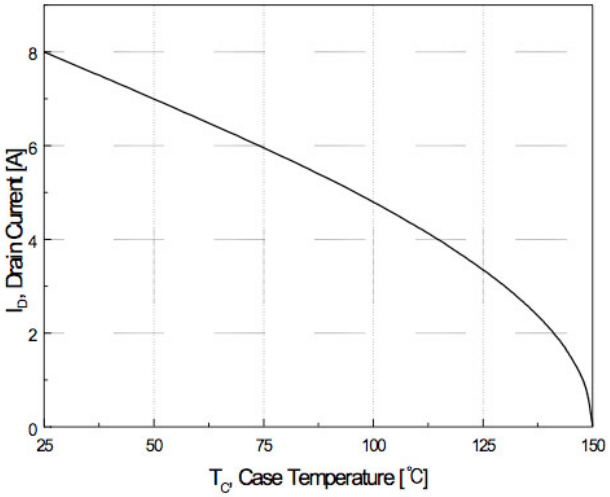


Figure 10. Maximum Drain Current vs. Case Temperature

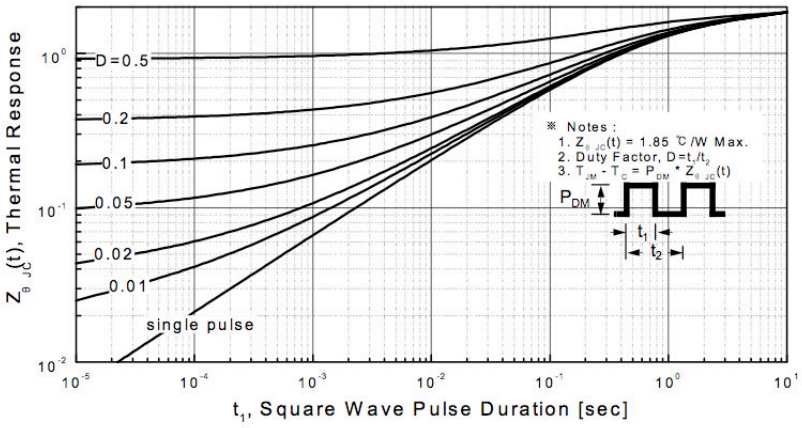


Figure 11. Transient Thermal Response Curve

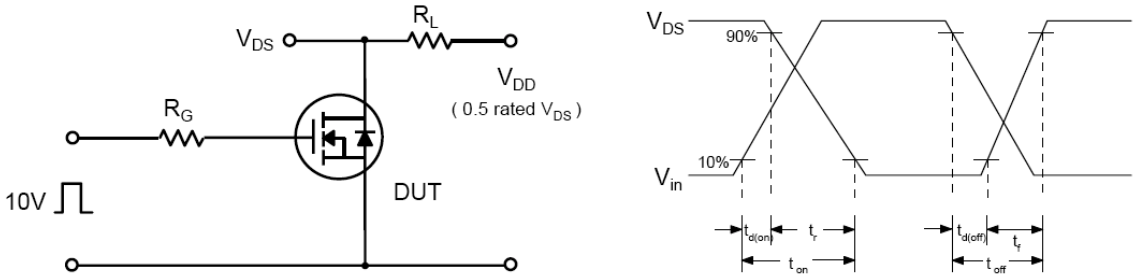


Fig 12. Resistive Switching Test Circuit & Waveforms

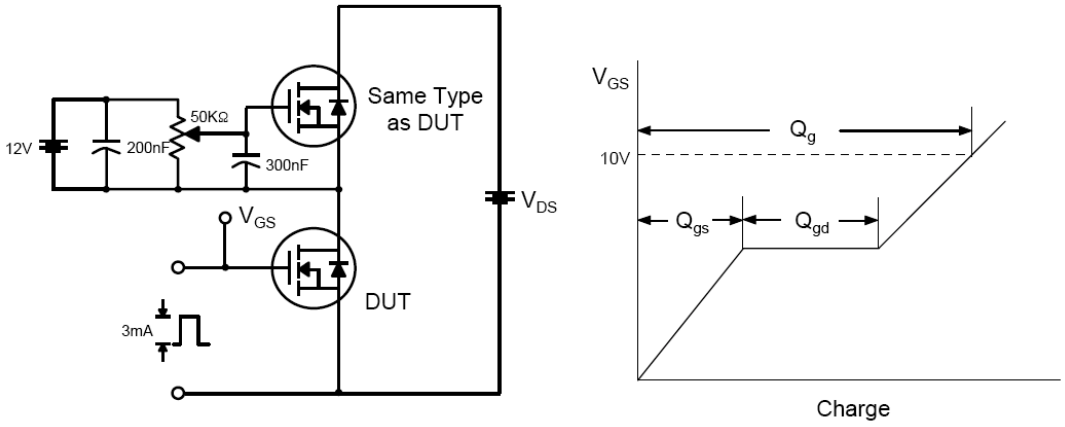


Fig 13. Gate Charge Test Circuit & Waveform

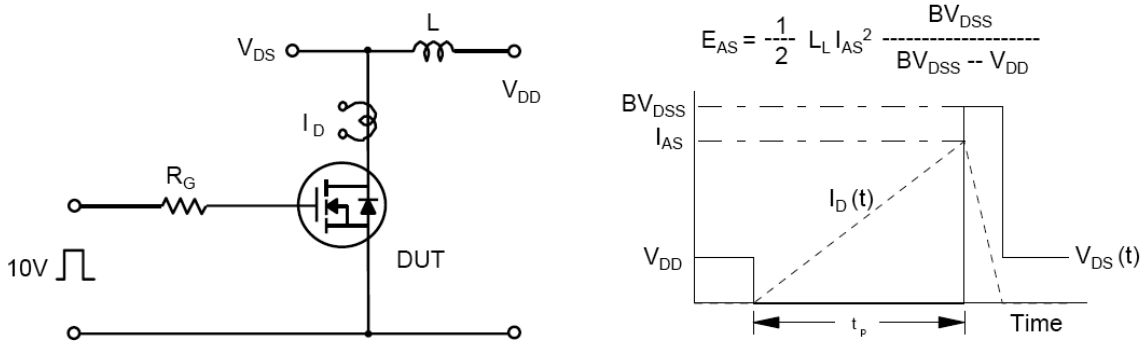


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

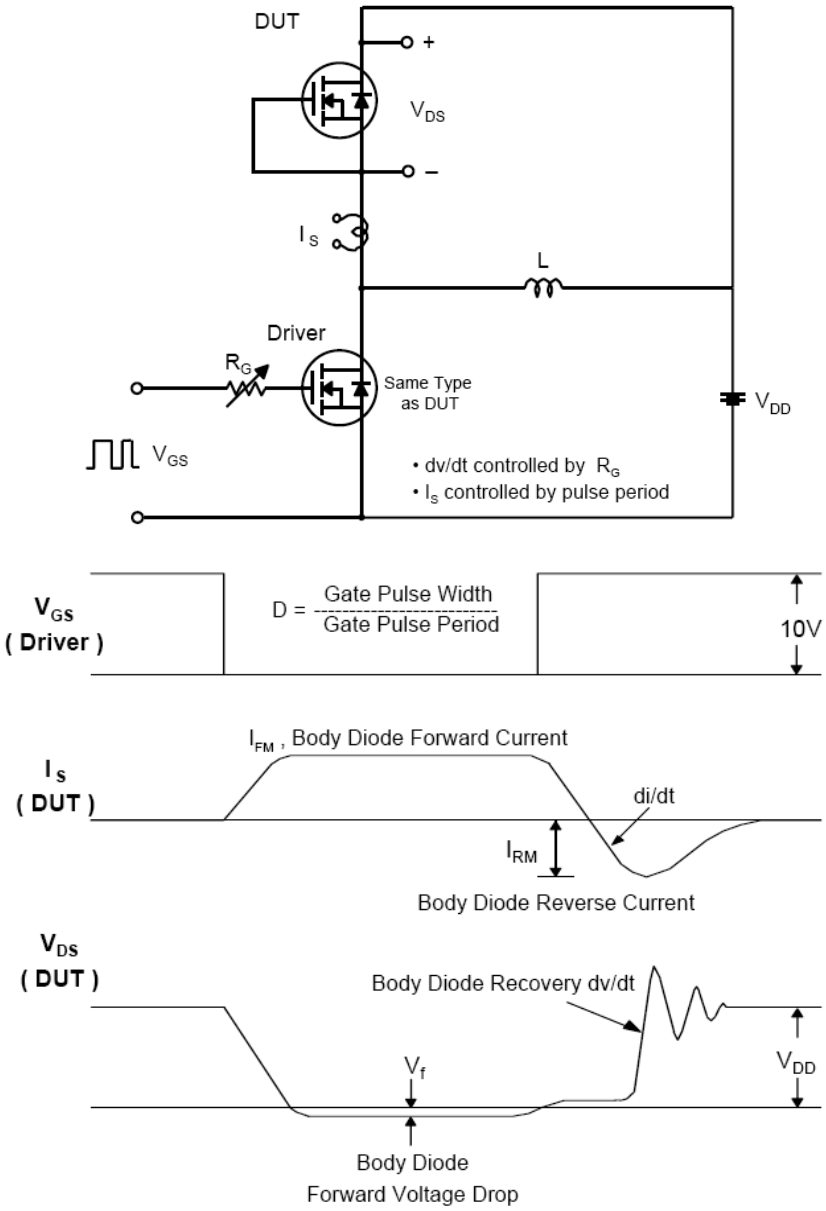


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Package Dimensions

Dimensions in Millimeters