Description

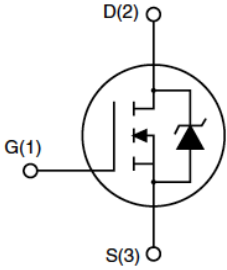### Features

- ● 800V, 10A
- ● $R_{DS(ON)}$ =0.8Ω (Typ.) @ V_{GS} = 10V, I_D =5A
- ● Fast Switching
- ● 100% Avalanche Tested
- ● Improved dv/dt Capability

Application

- ● Switch Mode Power Supply (SMPS)
- ● Uninterruptible Power Supply (UPS)
- ● Power Factor Correction (PFC)

TO-220F	TO-247	Schematic Diagram

Absolute Maximum Ratings (T$_C$=25℃ unless otherwise specified)

Symbol	Parameter		Max.		Units
			TO-220F	TO-247	
V_{DSS}	Drain-Source Voltage		800		V
V_{GSS}	Gate-Source Voltage		±30		V
I_D	Continuous Drain Current	T_C = 25℃	10		A
		T_C = 100℃	6		A
I_{DM}	Pulsed Drain Current [note1]		40		A
E_{AS}	Single Pulsed Avalanche Energy [note2]		562		mJ
P_D	Power Dissipation	T_C = 25℃	65	260	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		1.92	0.48	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		62.5	41	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		℃

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} = 0V,I_D = 250μA	800	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800V, V_{GS} = 0V, T_J = 25℃	-	-	1	μA
		V_{DS} = 640V, V_{GS} = 0V, T_J = 125℃			100	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±30V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS},I_D = 250μA	2.0	3.0	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance note3	V_{GS} =10V, I_D = 5A	-	0.8	1	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	-	1979	-	pF
C_{oss}	Output Capacitance		-	233	-	pF
C_{rss}	Reverse Transfer Capacitance		-	53	-	pF
Q_g	Total Gate Charge	V_{DD} = 640V, I_D =10A, V_{GS} = 10V	-	83	-	nC
Q_{gs}	Gate-Source Charge		-	9	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	49	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400V, I_D =10A, R_G = 25Ω	-	23	-	ns
t_r	Turn-On Rise Time		-	15	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	90	-	ns
t_f	Turn-Off Fall Time		-	30	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	10	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	40	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD}= 10A, T_J = 25℃	-	-	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_S = 10A, di/dt =100A/μs	-	320	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.2	-	uC

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

2. I_{AS} = 7.5A, V_{DD} = 50V, Starting T_J = 25°C

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤1%

Typical Performance Characteristics

Figure 1. Gate Charge Test Circuit & Waveform
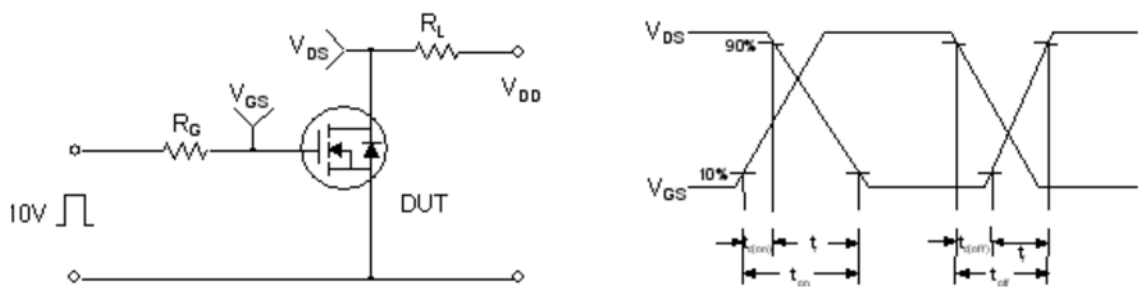
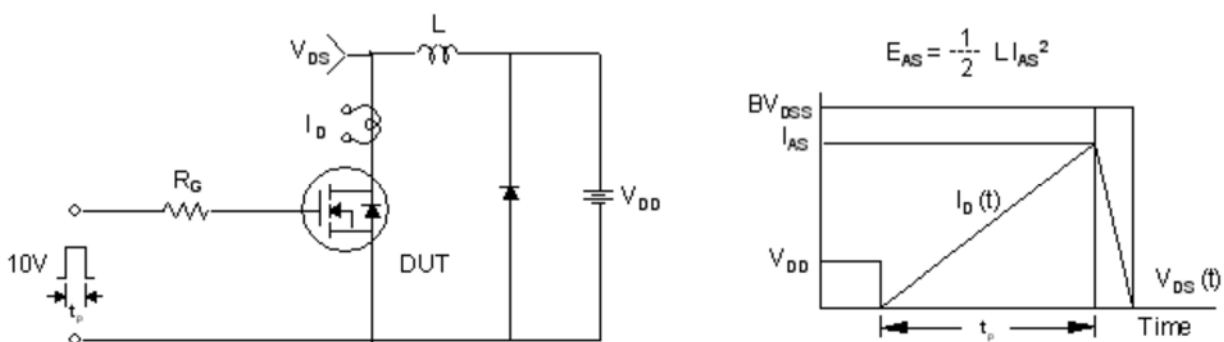**Figure 2. Resistive Switching Test Circuit & Waveforms**

$$E_{AS} = \frac{1}{2} L I_{AS}^2$$

Figure 3. Unclamped Inductive Switching Test Circuit & Waveforms

D.U.T

Circuit Layout Considerations
* Low Stray Inductance
* Ground Plane
* Low Leakage Inductance
  Current Transformer

③

②

①

R_G

* dv/dt controlled by R_G
* Driver same type as D.U.T.
* I_{SD} controlled by Duty Factor "D"
* D.U.T. - Device Under Test

④

$+ V_{DD}$

① Driver Gate Drive

P.W.

Period

$D = \dfrac{P.W.}{Period}$

$V_{GS} = 10V$ *

② D.U.T. I_{SD} Waveform

Reverse Recovery Current

Body Diode Forward Current

di/dt

③ D.U.T. V_{DS} Waveform

Diode Recovery dv/dt

V_{DD}

Re-Applied Voltage

Body Diode Forward Drop

④ Inductor Curent

Ripple ≤ 5%

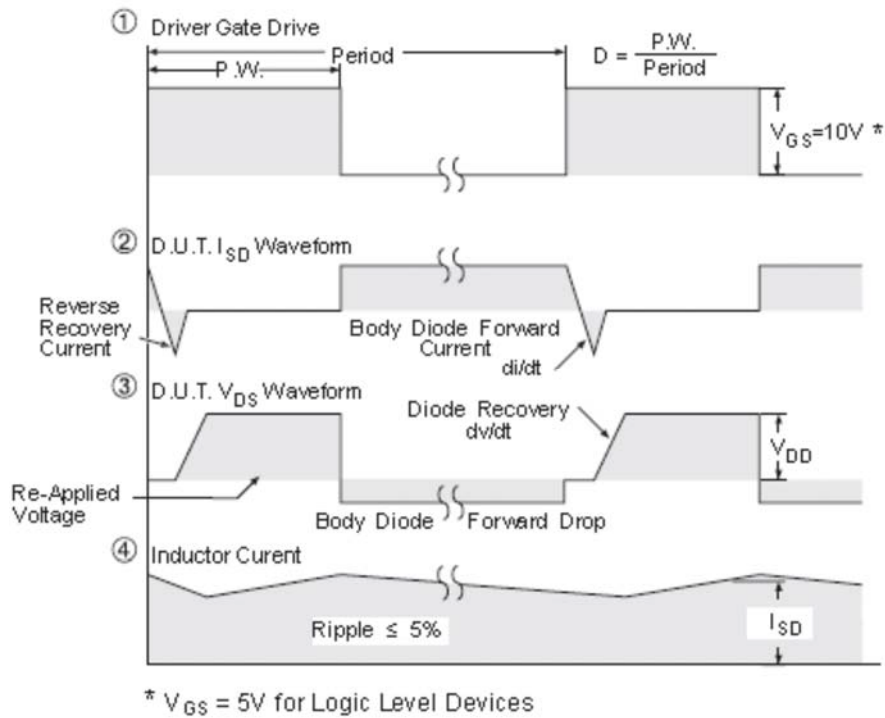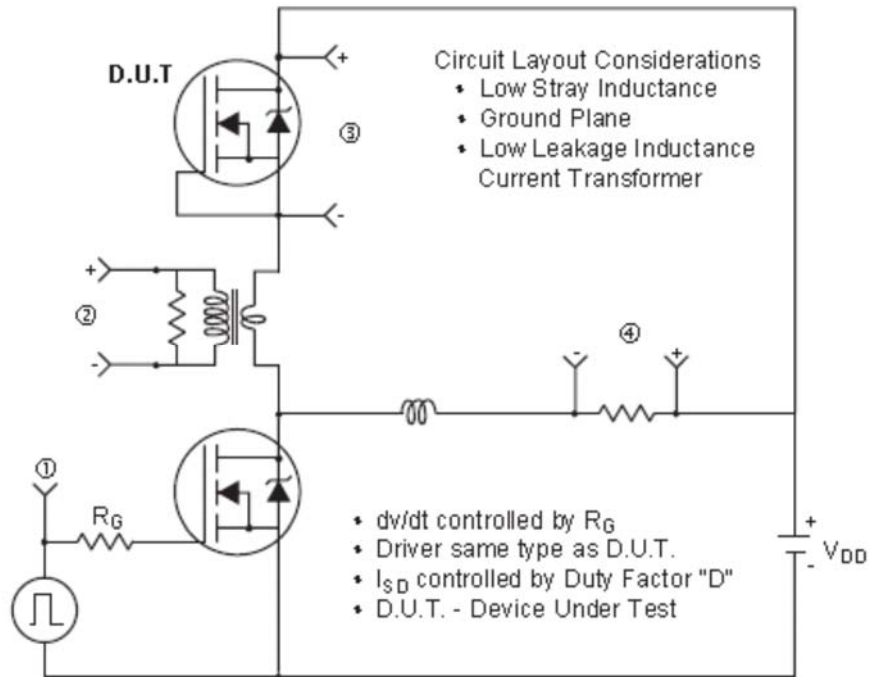I_{SD}

* $V_{GS} = 5V$ for Logic Level Devices

Figure 4. Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)