

MOSFET – N-Channel, POWERTRENCH®

100 V, 74 A, 12 mΩ

FDP120N10

Description

This N-Channel MOSFET is produced using **onsemi**'s advanced POWERTRENCH process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

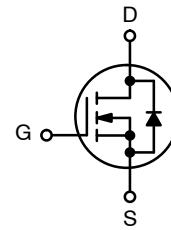
Features

- $R_{DS(on)} = 9.7\text{ m}\Omega$ (Typ.) @ $V_{GS} = 10\text{ V}$, $I_D = 74\text{ A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability RoHS Compliant
- This Device is Pb-Free, Halide Free and RoHS Compliant

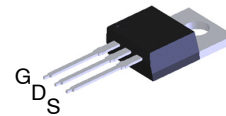
Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies
- Micor Solar Inverter

V_{DSS}	$R_{DS(on)}$ TYP	I_D MAX
100 V	9.7 mΩ @ 10 V	74 A

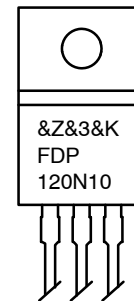


N-Channel MOSFET



TO-220-3LD
 CASE 340AT

MARKING DIAGRAM



- &Z = Assembly Plant Code
- &3 = 3-Digit Date Code Format
- &K = 3-Digit Lot Run Traceability Code
- FDP120N10 = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping
FDP120N10	TO-220 (Pb-Free)	800 Units / Tube

FDP120N10

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	FDP120N10	Unit
V_{DSS}	Drain to Source Voltage	100	V
V_{GSS}	Gate to Source Voltage	± 20	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ\text{C}$, Silicon Limited)	74
		- Continuous ($T_C = 100^\circ\text{C}$, Silicon Limited)	52
I_{DM}	Drain Current	- Pulsed (Note 1)	296
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	198	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	6.0	V/ns
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	170
		- Derate Above 25°C	1.14
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to $+175$	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Repetitive rating: pulse-width limited by maximum junction temperature.

2. $L = 0.11$ mH, $I_{AS} = 60$ A, $V_{DD} = 50$ V, $R_G = 25$ Ω , starting $T_J = 25^\circ\text{C}$.

3. $I_{SD} \leq 74$ A, di/dt ≤ 200 A/ μs , $V_{DD} \leq BV_{DSS}$, starting $T_J = 25^\circ\text{C}$.

THERMAL CHARACTERISTICS

Symbol	Parameter	FDP120N10	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.88	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

FDP120N10

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

BV _{DSS}	Drain to Source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0 V, T _C = 25°C	100	–	–	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C	–	0.1	–	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 100 V, V _{GS} = 0 V	–	–	1	μA
		V _{DS} = 100 V, V _{GS} = 0 V, T _C = 150°C	–	–	500	
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	–	–	±100	nA

ON CHARACTERISTICS

V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250 μA	2.5	–	4.5	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 74 A	–	9.7	12	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 74 A	–	105	–	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	–	4215	5605	pF
C _{oss}	Output Capacitance		–	405	540	pF
C _{rss}	Reverse Transfer Capacitance		–	170	255	pF
Q _{g(tot)}	Total Gate Charge at 10 V	V _{DS} = 80 V, I _D = 74 A, V _{GS} = 10 V (Note 4)	–	66	86	nC
Q _{gs}	Gate to Source Gate Charge		–	26	–	nC
Q _{gd}	Gate to Drain “Miller” Charge		–	20	–	nC

SWITCHING CHARACTERISTICS

t _{d(on)}	Turn-On Delay Time	V _{DD} = 50 V, I _D = 74 A, V _{GS} = 10 V, R _G = 4.7 Ω (Note 4)	–	27	64	ns
t _r	Turn-On Rise Time		–	105	220	ns
t _{d(off)}	Turn-Off Delay Time		–	39	88	ns
t _f	Turn-Off Fall Time		–	15	40	ns

DRAIN-SOURCE DIODE CHARACTERISTICS

I _S	Maximum Continuous Drain to Source Diode Forward Current		–	–	74	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		–	–	296	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 74 A	–	–	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 74 A, dI _F /dt = 100 A/μs	–	44	–	ns
Q _{rr}	Reverse Recovery Charge		–	67	–	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

*Package limitation current is 120 A.

4. Essentially independent of operating temperature typical characteristics.

TYPICAL PERFORMANCE CHARACTERISTICS

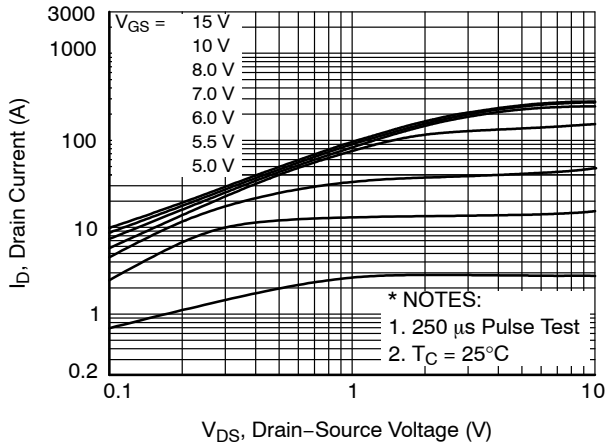


Figure 1. On-Region Characteristics

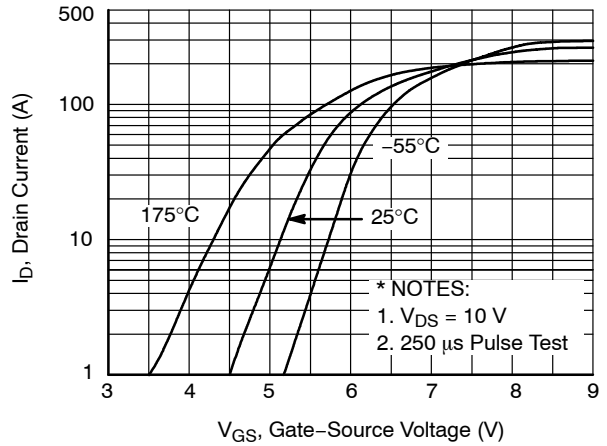


Figure 2. Transfer Characteristics

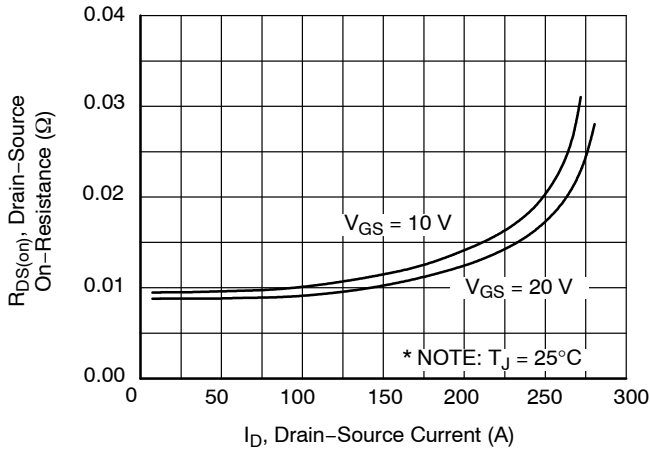


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

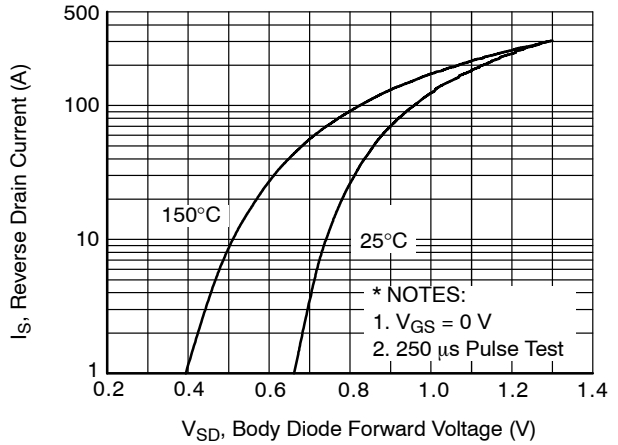


Figure 4. Body Diode Forward Voltage Variation vs. Source Current And Temperature

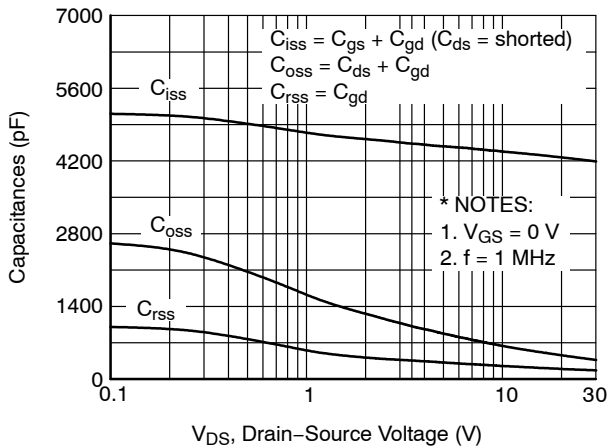


Figure 5. Capacitance Characteristics

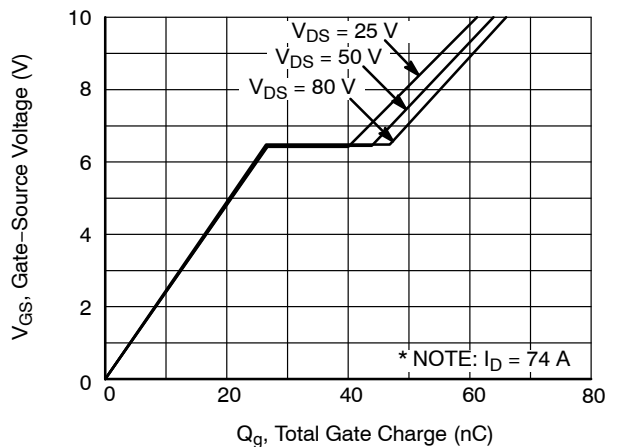


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

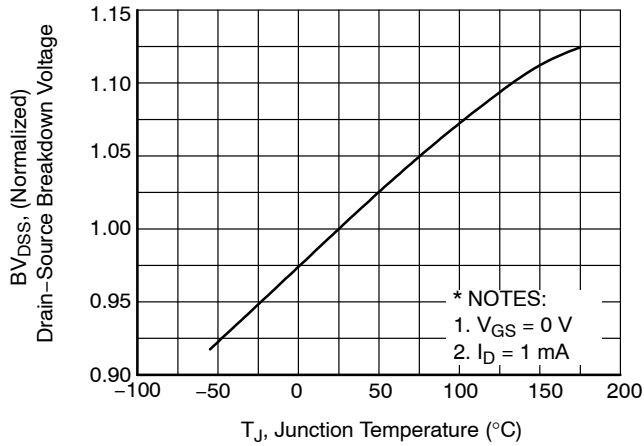


Figure 7. Breakdown Voltage Variation vs. Temperature

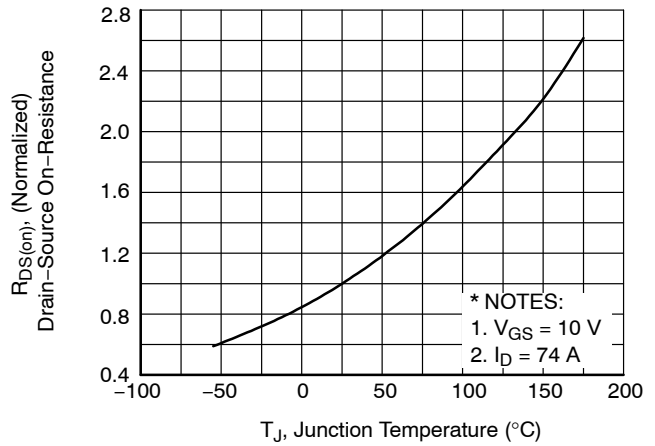


Figure 8. On-Resistance Variation vs. Temperature

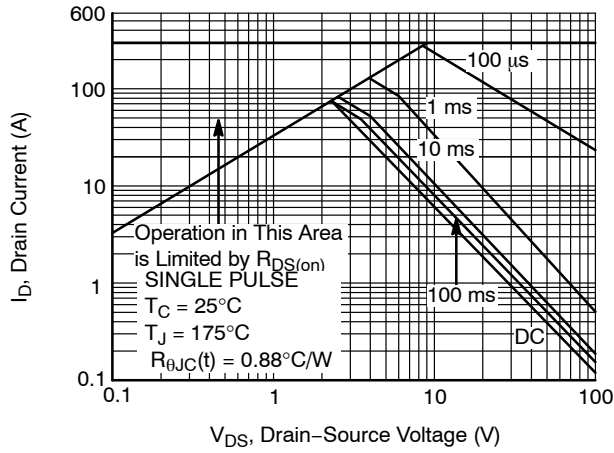


Figure 9. Maximum Safe Operating Area

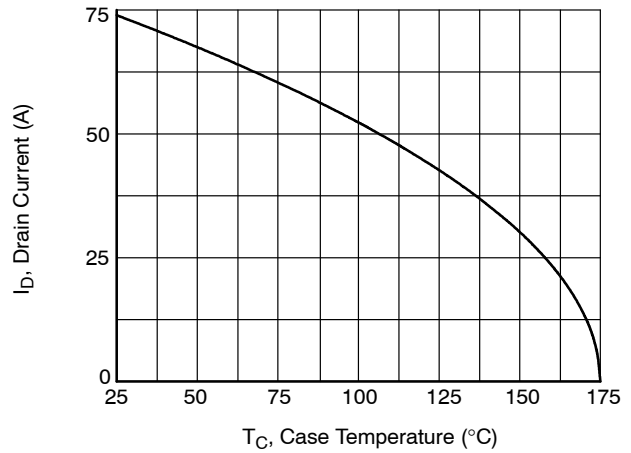


Figure 10. Maximum Drain Current vs. Case Temperature

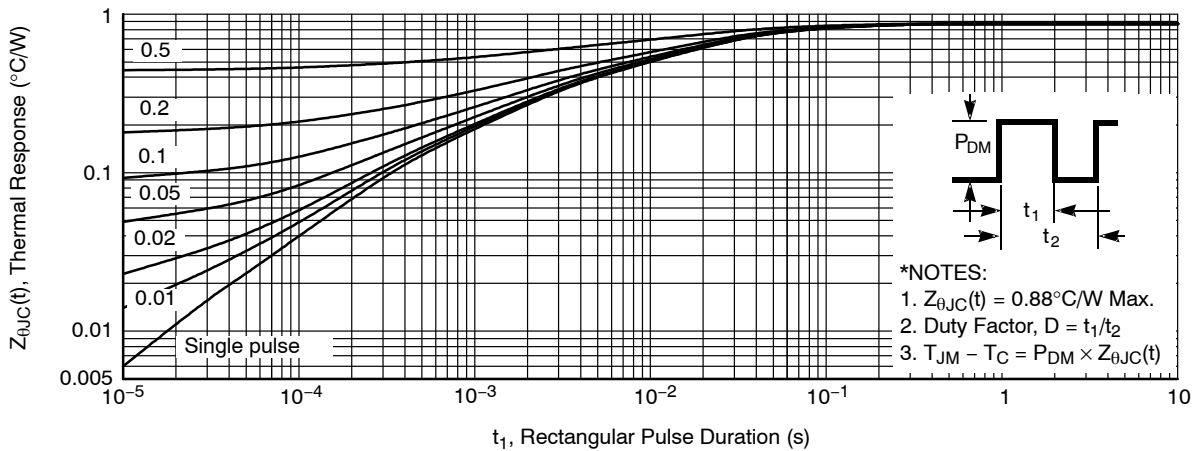


Figure 11. Transient Thermal Response Curve

FDP120N10

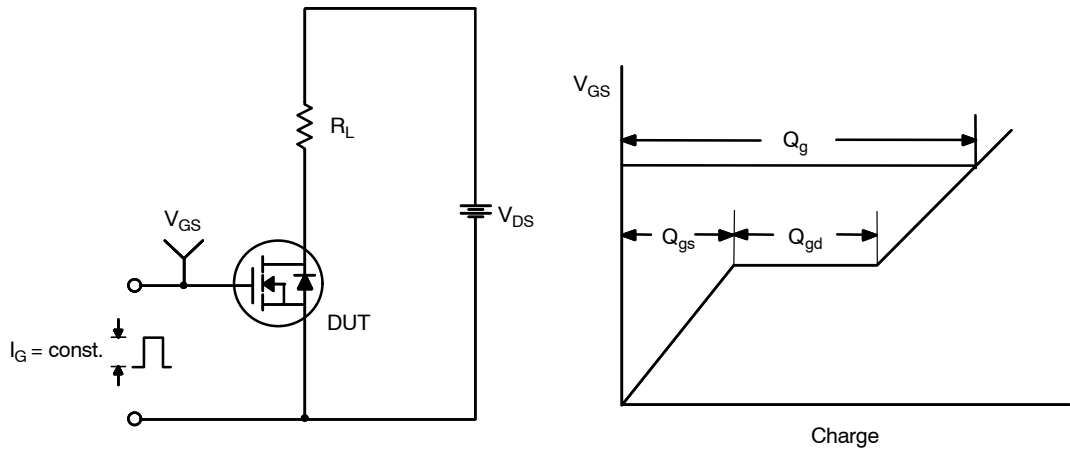


Figure 12. Gate Charge Test Circuit & Waveform

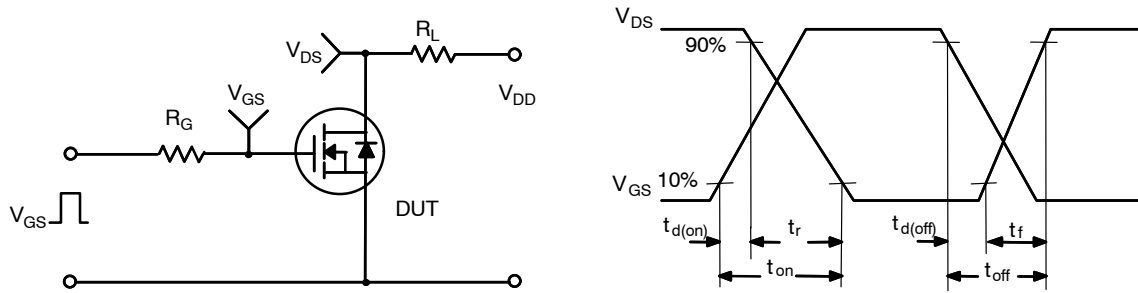


Figure 13. Resistive Switching Test Circuit & Waveforms

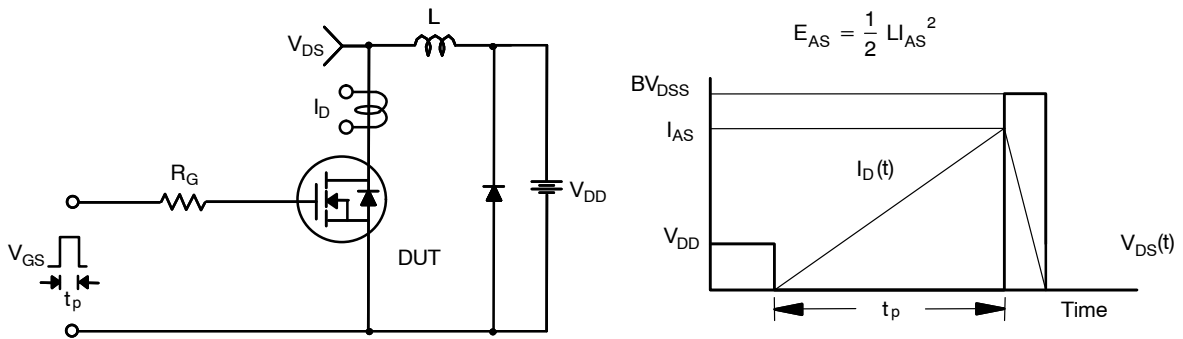


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

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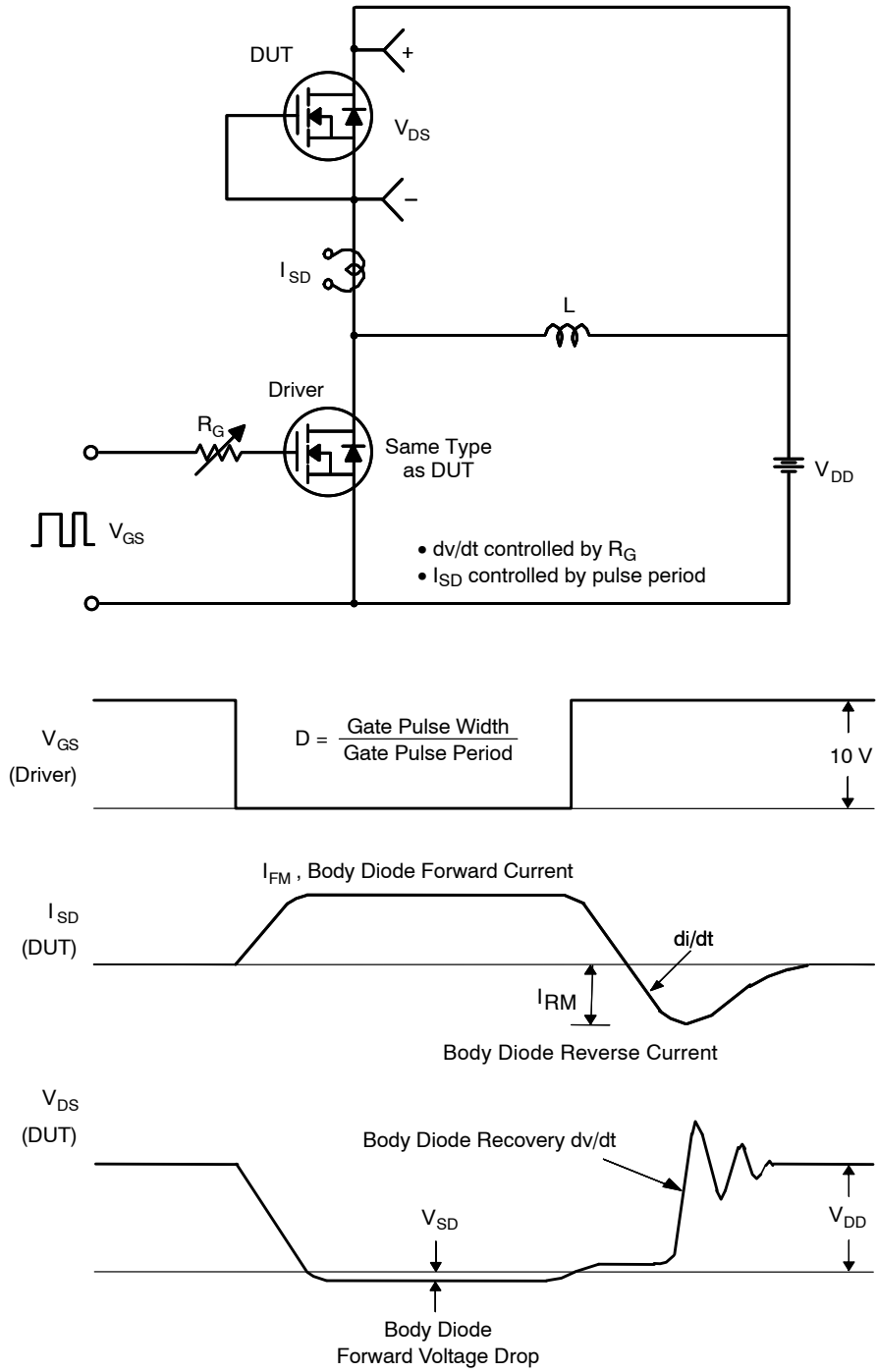


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®



Scale 1:1

TO-220-3LD CASE 340AT ISSUE A

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DESCRIPTION:	TO-220-3LD	PAGE 1 OF 1

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