

MOSFET – N-Channel, POWERTRENCH®

60 V, 88 A, 3.5 mΩ

FDPF035N06B-F154

Description

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

Features

- $R_{DS(on)} = 2.91 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 88 \text{ A}$
- Low FOM $R_{DS(on)} * Q_G$
- Low Reverse Recovery Charge, Q_{rr}
- Soft Reverse Recovery Body Diode
- Enables Highly Efficiency in Synchronous Rectification
- Fast Switching Speed
- 100% UIL Tested
- These Devices are Pb-Free and are RoHS Compliant

Applications

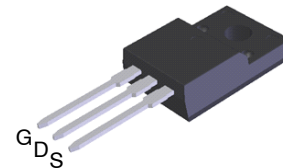
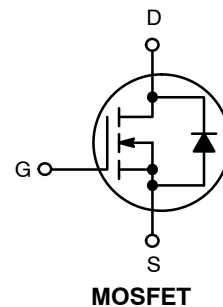
- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies
- Renewable System



ON Semiconductor®

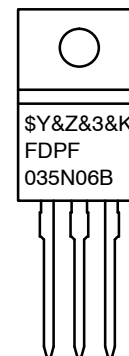
www.onsemi.com

V_{DS}	$R_{DS(on)} \text{ MAX}$	$I_D \text{ MAX}$
60 V	3.5 mΩ @ 10 V	88 A



TO-220F Ultra Narrow Lead
CASE 221BN

MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Data Code (Year & Week)
&K	= Lot
FDPF035N06B	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FDPF035N06B–F154

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

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		60	V
V_{GSS}	Gate to Source Voltage		± 20	V
I_D	Drain Current	– Continuous ($T_C = 25^\circ\text{C}$, Silicon Limited)	88	A
		– Continuous ($T_C = 100^\circ\text{C}$, Silicon Limited)	62	
I_{DM}	Drain Current	– Pulsed (Note 1)	352	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		600	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		6.0	V/ns
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	46.3	W
		– Derate Above 25°C	0.31	W/ $^\circ\text{C}$
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. $L = 3\text{ mH}$, $I_{AS} = 20\text{ A}$, starting $T_J = 25^\circ\text{C}$.

3. $I_{SD} \leq 100\text{ A}$, $di/dt \leq 200\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, starting $T_J = 25^\circ\text{C}$.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	3.24	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	$^\circ\text{C}/\text{W}$

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Marking	Package	Shipping
FDPF035N06B–F154	FDPF035N06B	TO–220F (Pb–Free)	50 Units / Tube

FDPF035N06B–F154

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
--------	-----------	-----------------	------	------	------	------

OFF CHARACTERISTICS

BV _{DSS}	Drain to Source Breakdown Voltage	I _D = 250 μ A, V _{GS} = 0 V	60	–	–	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	I _D = 250 μ A, Referenced to 25°C	–	0.03	–	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 48 V, V _{GS} = 0 V	–	–	1	μ A
I _{GSS}	Gate to Body Leakage Current	V _{GS} = \pm 20 V, V _{DS} = 0 V	–	–	\pm 100	nA

ON CHARACTERISTICS

V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250 μ A	2	–	4	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 88 A	–	2.91	3.5	m Ω
g _{FS}	Forward Transconductance	V _{DS} = 20 V, I _D = 88 A	–	176	–	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V _{DS} = 30 V, V _{GS} = 0 V, f = 1 MHz	–	6035	8030	pF
C _{oss}	Output Capacitance		–	1685	2240	pF
C _{rss}	Reverse Transfer Capacitance		–	55	–	pF
C _{oss(er)}	Energy Related Output Capacitance	V _{DS} = 30 V, V _{GS} = 0 V	–	2619	–	
Q _{g(tot)}	Total Gate Charge at 10 V	V _{DS} = 30 V, I _D = 100 A, V _{GS} = 10 V (Note 4)	–	76	99	nC
Q _{gs}	Gate to Source Gate Charge		–	29	–	nC
Q _{gd}	Gate to Drain “Miller” Charge		–	12	–	nC
V _{plateau}	Gate Plateau Voltage		–	5.2	–	V
Q _{sync}	Total Gate Charge Sync.	V _{DS} = 0 V, I _D = 50 A	–	67.3	–	nC
Q _{oss}	Output Charge	V _{DS} = 30 V, V _{GS} = 0 V	–	92.4	–	nC
ESR	Equivalent Series Resistance (G–S)	f = 1 MHz	–	2.0	–	Ω

SWITCHING CHARACTERISTICS

t _{d(on)}	Turn-On Delay Time	V _{DD} = 30 V, I _D = 100 A, V _{GS} = 10 V, R _g = 4.7 Ω (Note 4)	–	32	74	ns
t _r	Turn-On Rise Time		–	33	76	ns
t _{d(off)}	Turn-Off Delay Time		–	56	122	ns
t _f	Turn-Off Fall Time		–	23	56	ns

DRAIN–SOURCE DIODE CHARACTERISTICS

I _S	Maximum Continuous Source to Drain Diode Forward Current		–	–	88	A
I _{SM}	Maximum Pulsed Source to Drain Diode Forward Current		–	–	352	A
V _{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 88 A	–	–	1.25	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 100 A, dI _F /dt = 100 A/ μ s	–	71	–	ns
Q _{rr}	Reverse Recovery Charge		–	78	–	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.

4. Essentially independent of operating temperature typical characteristics.

TYPICAL PERFORMANCE CHARACTERISTICS

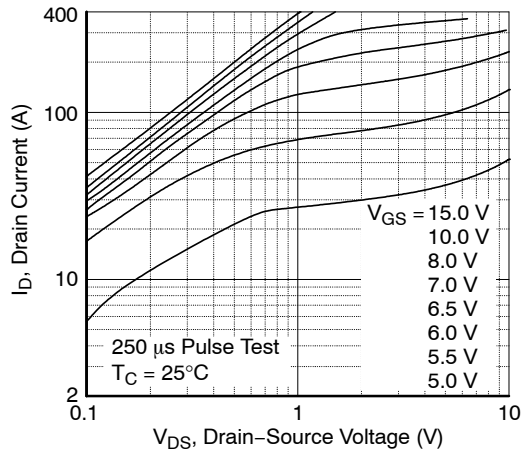


Figure 1. On-Region Characteristics

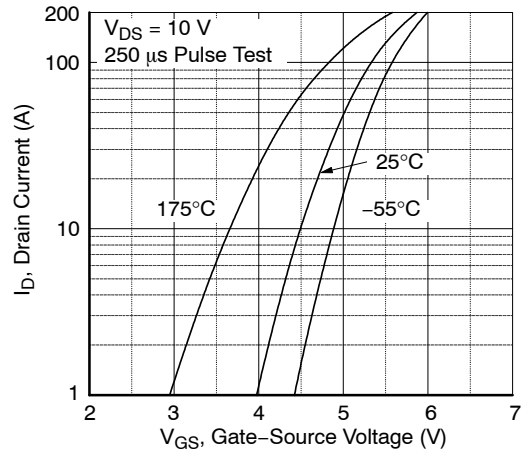


Figure 2. Transfer Characteristics

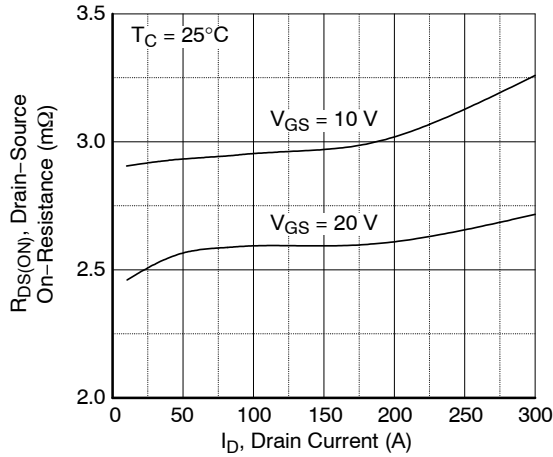


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

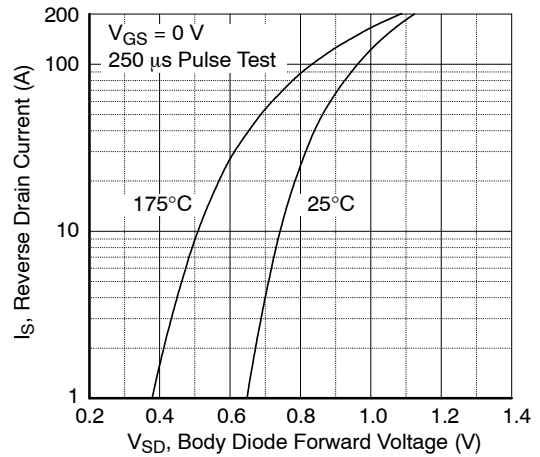


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

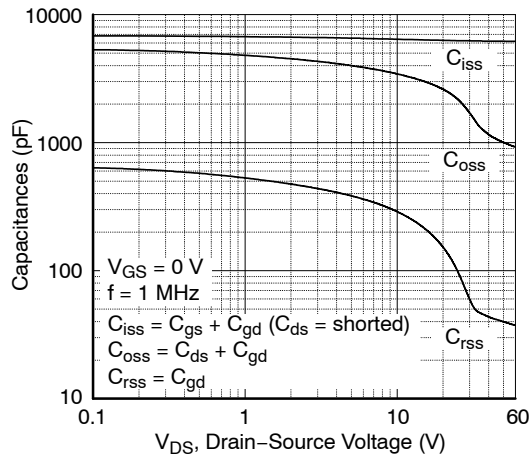


Figure 5. Capacitance Characteristics

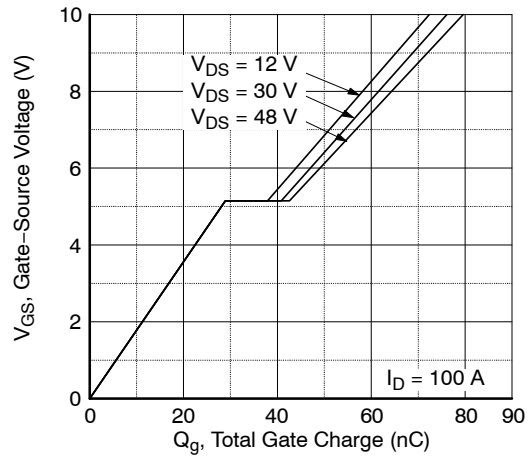


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

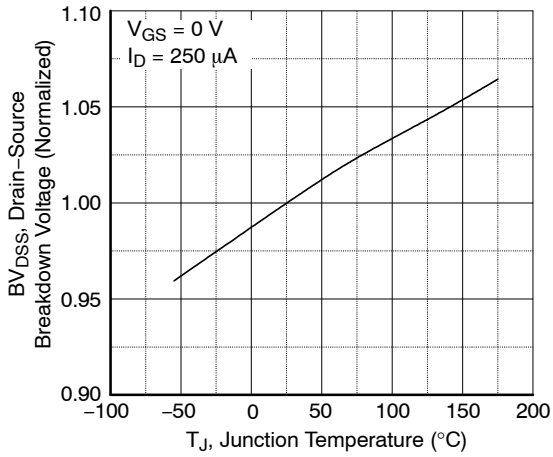


Figure 7. Breakdown Voltage Variation vs. Temperature

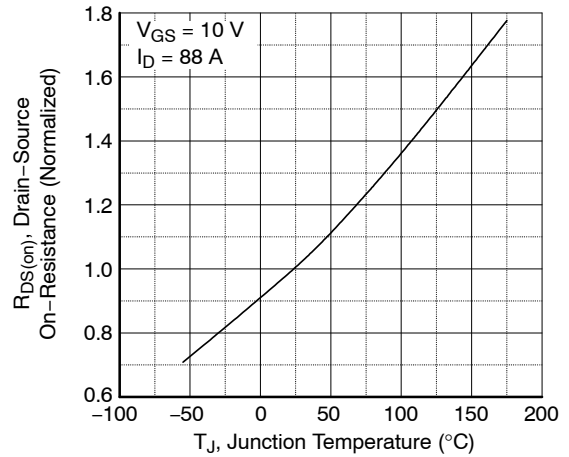


Figure 8. On-Resistance Variation vs. Temperature

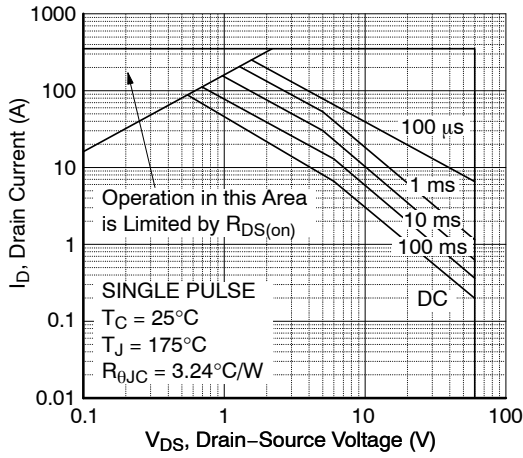


Figure 9. Maximum Safe Operating Area

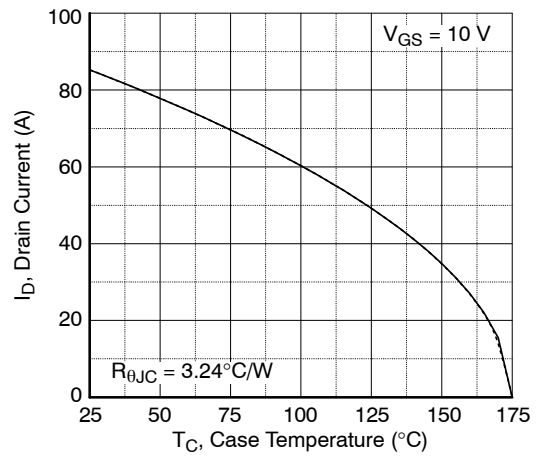


Figure 10. Maximum Drain Current vs. Case Temperature

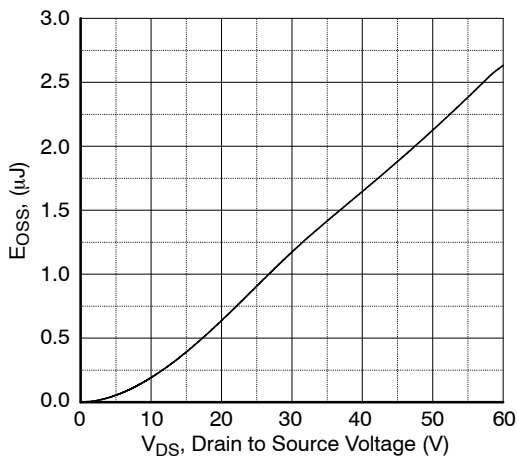


Figure 11. E_{OSS} vs. Drain to Source Voltage

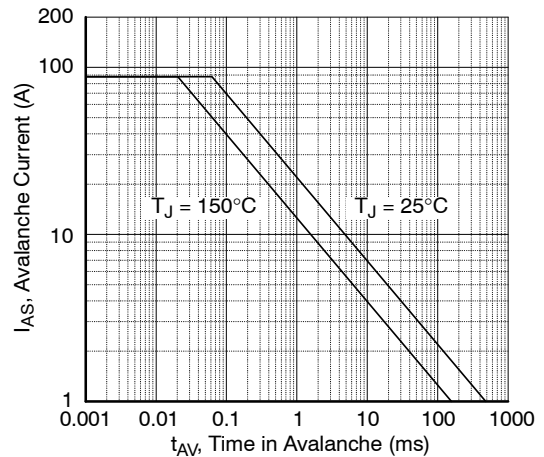


Figure 12. Unclamped Inductive Switching Capability

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

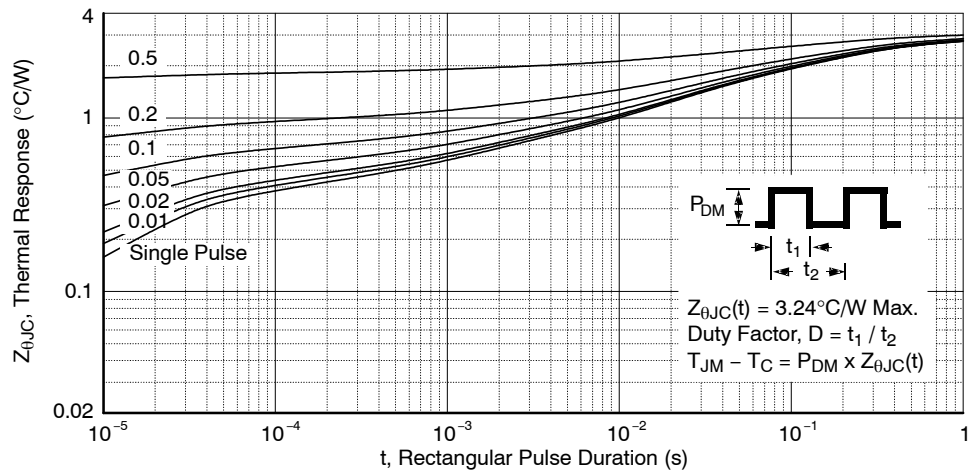


Figure 13. Transient Thermal Response Curve

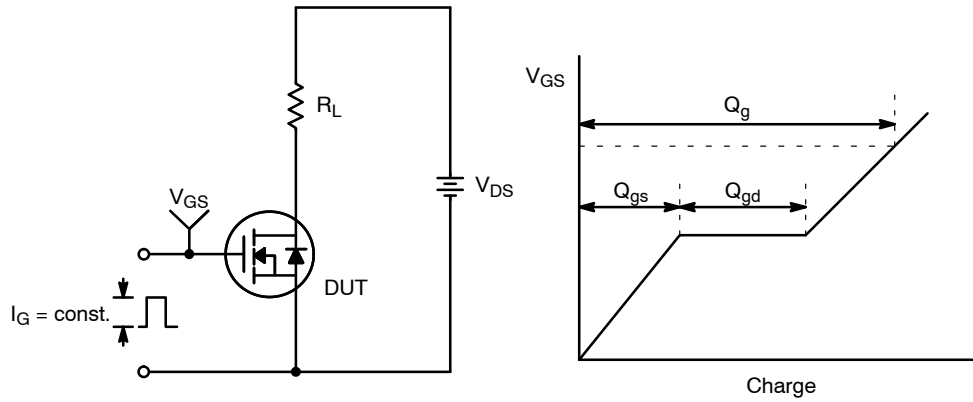


Figure 14. Gate Charge Test Circuit & Waveform

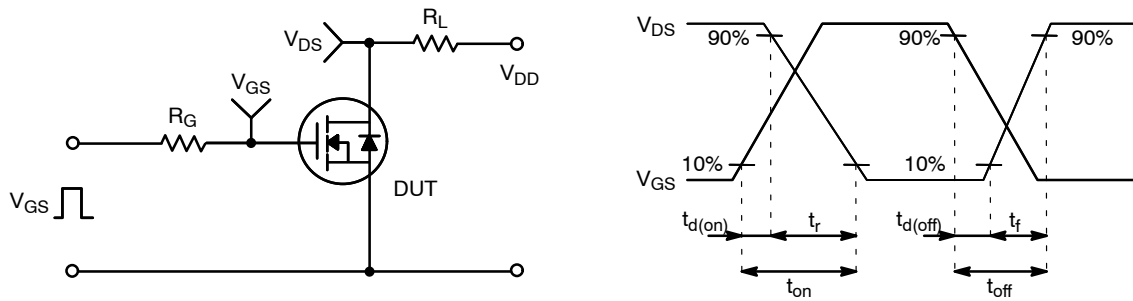


Figure 15. Resistive Switching Test Circuit & Waveforms

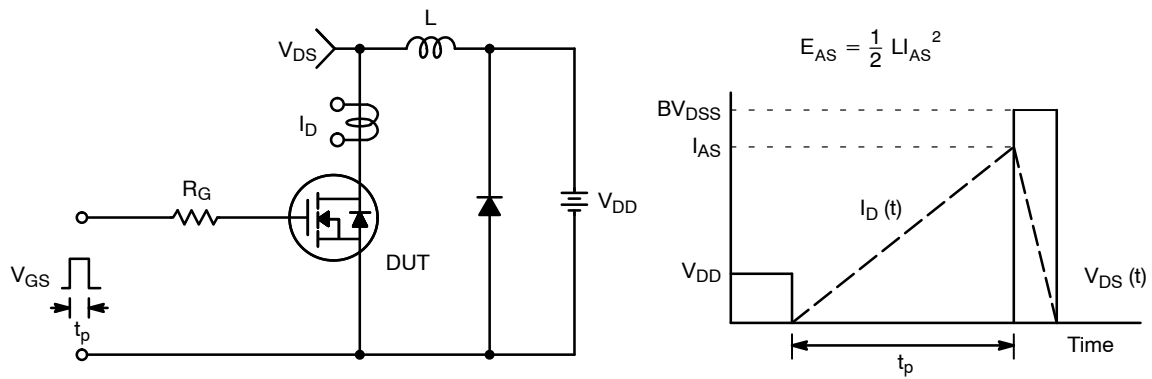


Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms

FDPF035N06B-F154

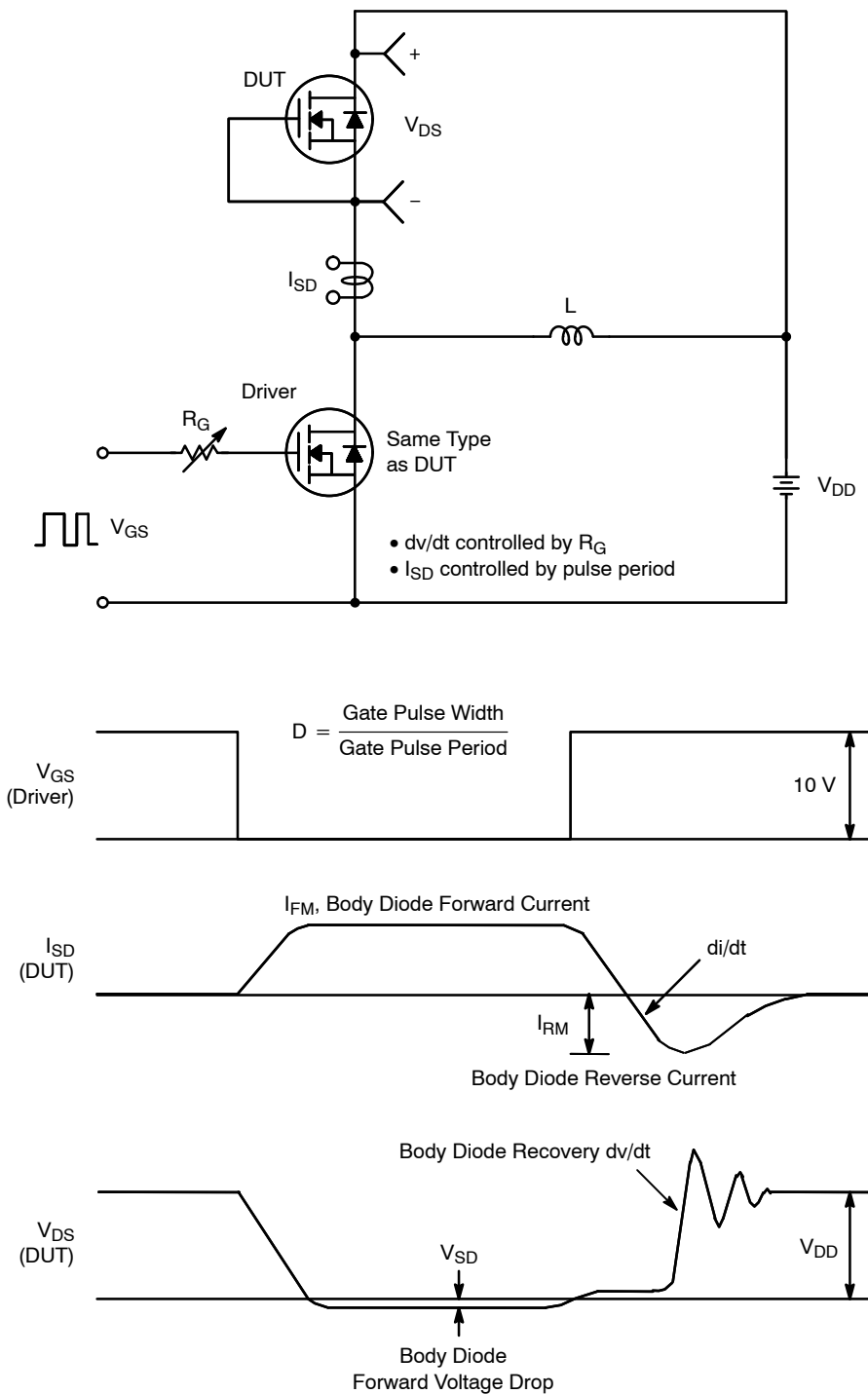
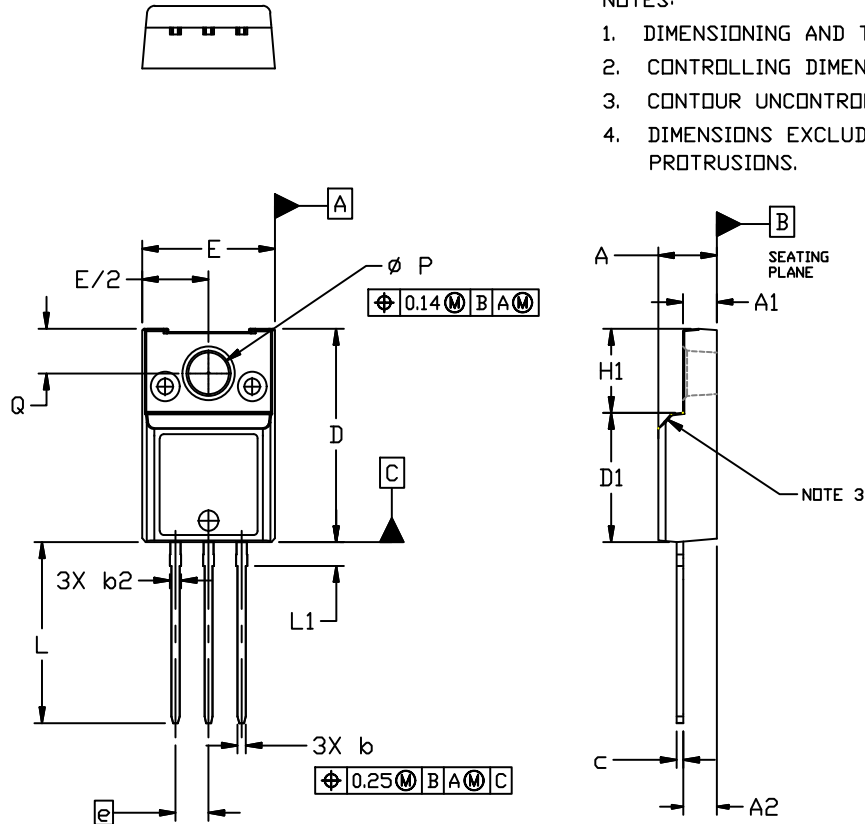
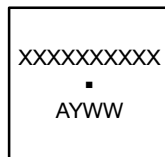


Figure 17. Peak Recovery dv/dt Test Circuit & Waveforms

POWERTRENCH is a registered trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

TO-220 FULLPACK, 3-LEAD (ULTRA NARROW LEAD)
CASE 221BN
ISSUE A

DATE 07 MAY 2021


**GENERIC
MARKING DIAGRAM***


XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

DOCUMENT NUMBER:	98AON01135H	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-220 FULLPACK, 3-LEAD (ULTRA NARROW LEAD)	PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales