

MOSFET – N-Channel, UniFET™ II

600 V, 17 A, 340 mΩ

FDPF17N60NT

Description

UniFET II MOSFET is onsemi's high voltage MOSFET family based on advanced planar stripe and DMOS technology. This advanced MOSFET family has the smallest on-state resistance among the planar MOSFET, and also provides superior switching performance and higher avalanche energy strength. In addition, internal gate-source ESD diode allows UniFET II MOSFET to withstand over 2 kV HBM surge stress. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.

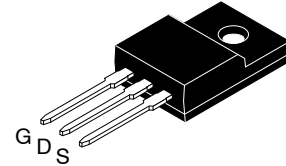
Features

- $R_{DS(on)} = 290 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 8.5 \text{ A}$
- Low Gate Charge (Typ. 48 nC)
- Low C_{rss} (Typ. 23 pF)
- 100% Avalanche Tested
- Improved dv/dt Capability
- RoHS Compliant

Applications

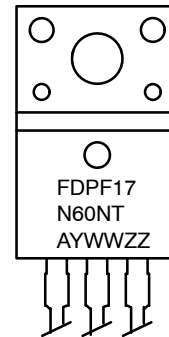
- LCD/LED/PDP TV
- Lighting
- Uninterruptible Power Supply
- AC-DC Power Supply

V_{DS}	$R_{DS(on)}$ MAX	I_D MAX
600 V	340 mΩ @ 10 V	17 A



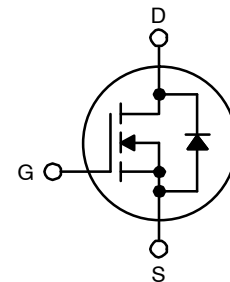
TO-220 Fullpack, 3-Lead / TO-220F-3SG
CASE 221AT

MARKING DIAGRAM



FDPF17N60NT = Specific Device Code
A = Assembly Location
YWW = Date Code (Year & Week)
ZZ = Assembly Lot

N-CHANNEL MOSFET



ORDERING INFORMATION

Part Number	Package	Shipping
FDPF17N60NT	TO-220F	1000 Units / Tube

FDPF17N60NT

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

Symbol	Parameter		FDPF17N60NT	Unit
V_{DSS}	Drain to Source Voltage		600	V
V_{GSS}	Gate to Source Voltage		± 30	V
I_D	Drain Current	– Continuous ($T_C = 25^\circ\text{C}$)	17*	A
		– Continuous ($T_C = 100^\circ\text{C}$)	10.2*	
I_{DM}	Drain Current	– Pulsed (Note 1)	68*	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		838	mJ
I_{AR}	Avalanche Current (Note 1)		17	A
E_{AR}	Repetitive Avalanche Energy (Note 1)		24.5	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		10	V/ns
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	62.5	W
		– Derate Above 25°C	0.5	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range		–55 to +150	$^\circ\text{C}$
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. $L = 5.8\text{ mH}$, $I_{AS} = 17\text{ A}$, $V_{DD} = 50\text{ V}$, $R_G = 25\ \Omega$, starting $T_J = 25^\circ\text{C}$.
3. $I_{SD} \leq 17\text{ A}$, $di/dt \leq 200\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, starting $T_J = 25^\circ\text{C}$.

THERMAL CHARACTERISTICS

Symbol	Parameter	FDPF17N60NT	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	2.0	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

FDPF17N60NT

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, T _C = 25°C	600	–	–	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	I _D = 250 μ A, Referenced to 25°C	–	0.8	–	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 600 V, V _{GS} = 0 V	–	–	1	μ A
		V _{DS} = 480 V, V _{GS} = 0 V, T _C = 150°C	–	–	10	
I _{GSS}	Gate to Body Leakage Current	V _{GS} = $\pm$ 30 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	3.0	–	5.0	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 8.5 A	–	0.29	0.34	Ω
g _{FS}	Forward Transconductance	V _{DS} = 20 V, I _D = 8.5 A	–	21	–	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	–	2285	3040	pF
C _{oss}	Output Capacitance		–	310	410	pF
C _{rss}	Reverse Transfer Capacitance		–	23	35	pF
Q _{g(tot)}	Total Gate Charge at 10 V	V _{DS} = 480 V, I _D = 17 A, V _{GS} = 10 V (Note 4)	–	48	65	nC
Q _{gs}	Gate to Source Gate Charge		–	13	–	nC
Q _{gd}	Gate to Drain "Miller" Charge		–	20	–	nC

SWITCHING CHARACTERISTICS

t _{d(on)}	Turn-On Delay Time	V _{DD} = 300 V, I _D = 17 A, V _{GS} = 10 V, R _G = 25 Ω (Note 4)	–	48	106	ns
t _r	Turn-On Rise Time		–	79	168	ns
t _{d(off)}	Turn-Off Delay Time		–	128	266	ns
t _f	Turn-Off Fall Time		–	62	134	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		–	–	68	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 17 A	–	–	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 17 A, dI _F /dt = 100 A/μs	–	575	–	ns
Q _{rr}	Reverse Recovery Charge		–	7.2	–	μC

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

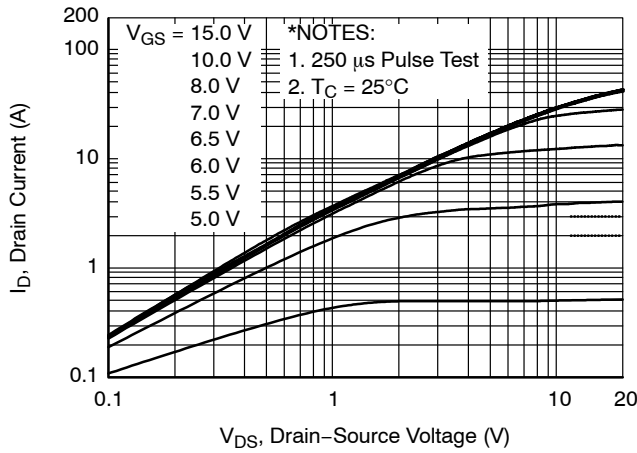


Figure 1. On-Region Characteristics

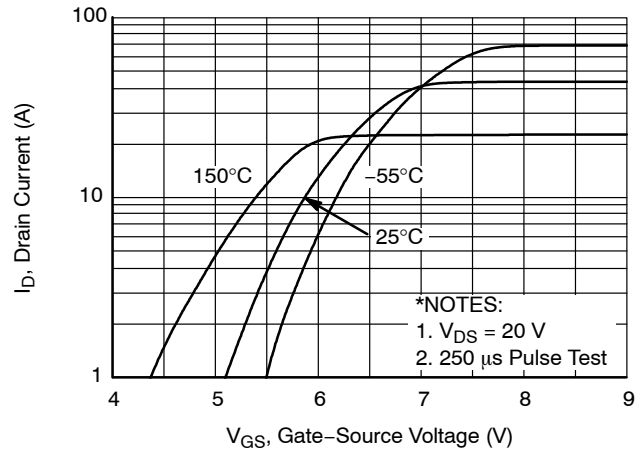


Figure 2. Transfer Characteristics

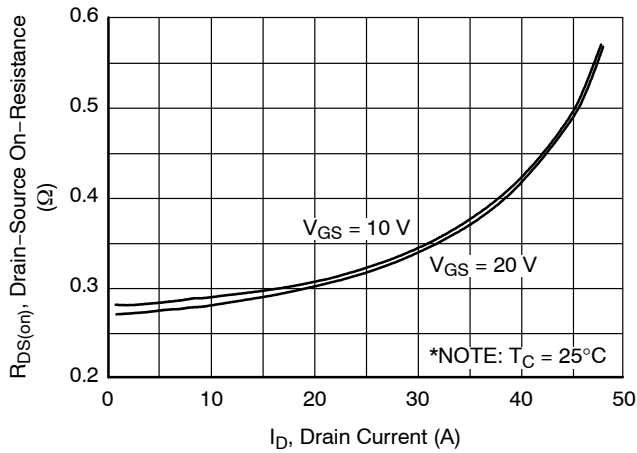


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

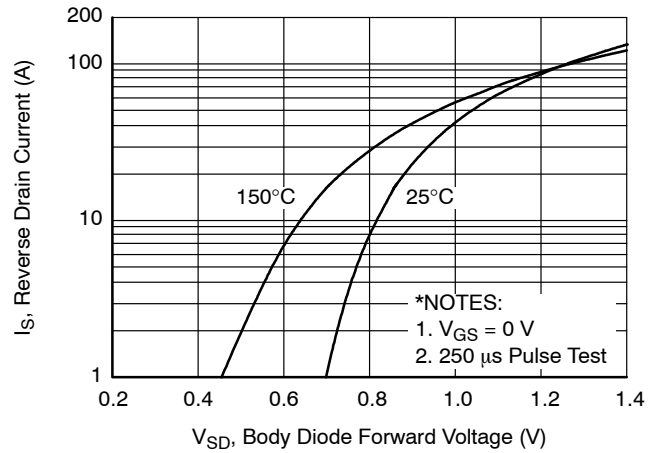


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

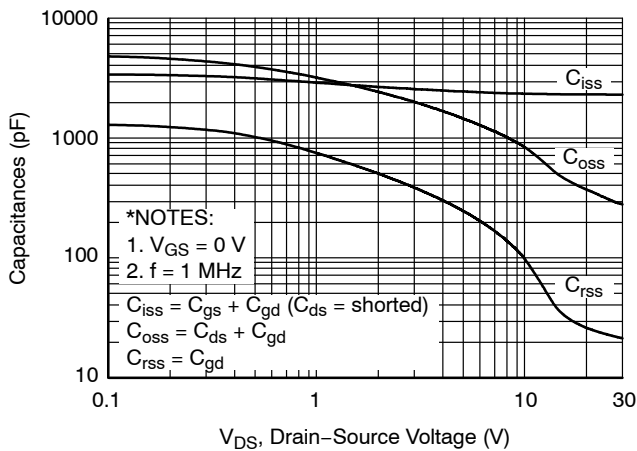


Figure 5. Capacitance Characteristics

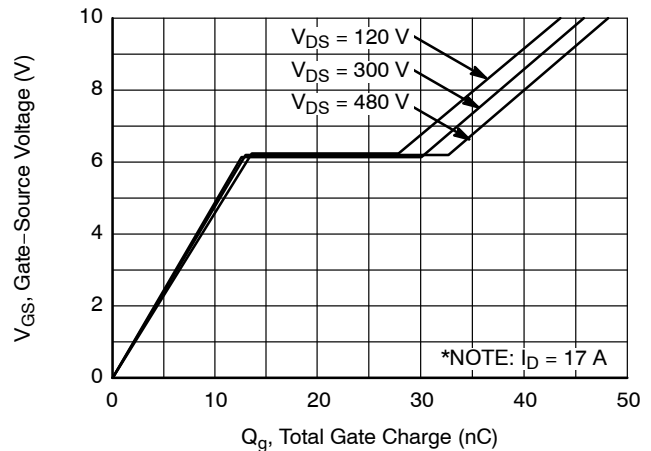


Figure 6. Gate Charge Characteristics

FDPF17N60NT

Typical Performance Characteristics (Continued)

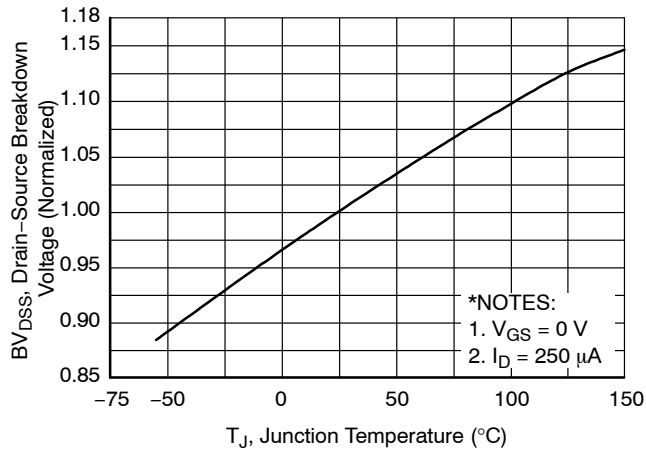


Figure 7. Breakdown Voltage Variation vs. Temperature

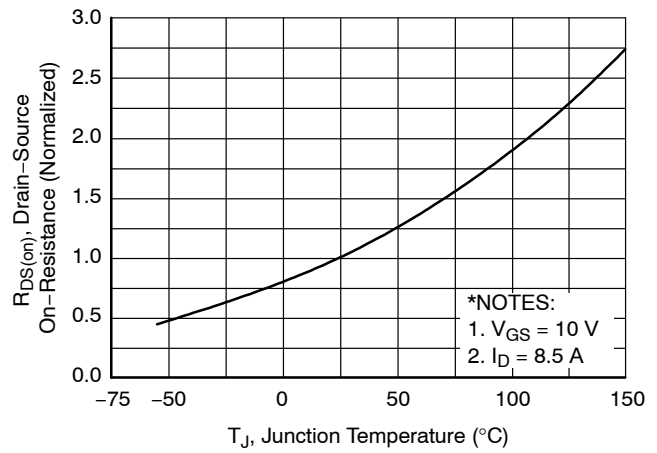


Figure 8. On-Resistance Variation vs. Temperature

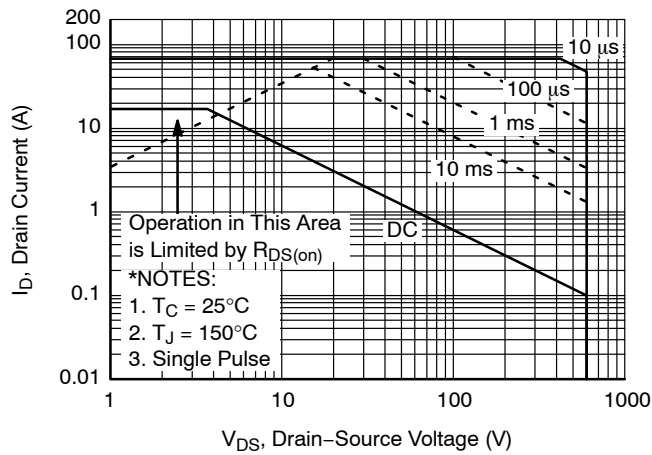


Figure 9. Maximum Safe Operating Area

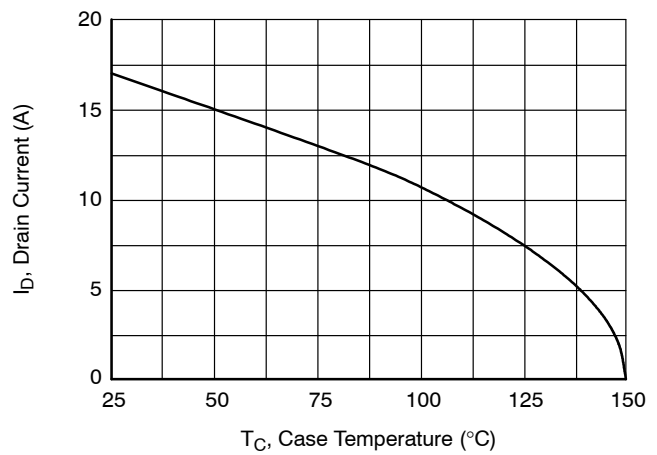


Figure 10. Maximum Drain Current vs. Case Temperature

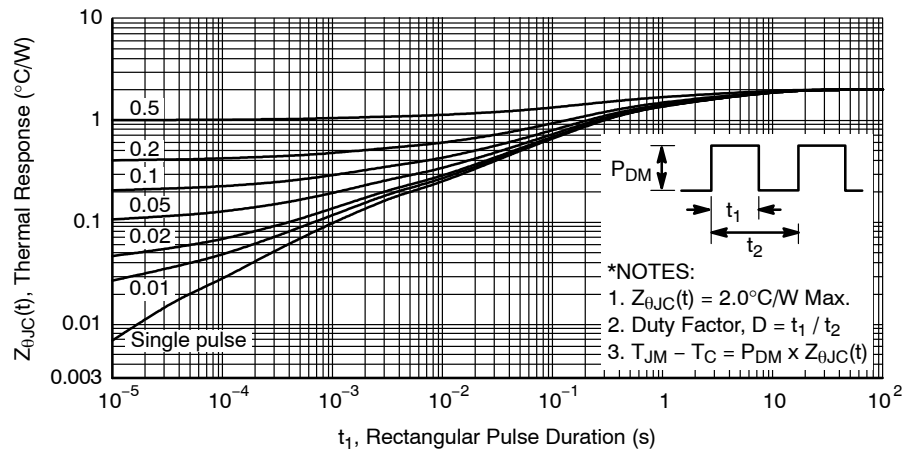


Figure 11. Transient Thermal Response Curve

FDPF17N60NT

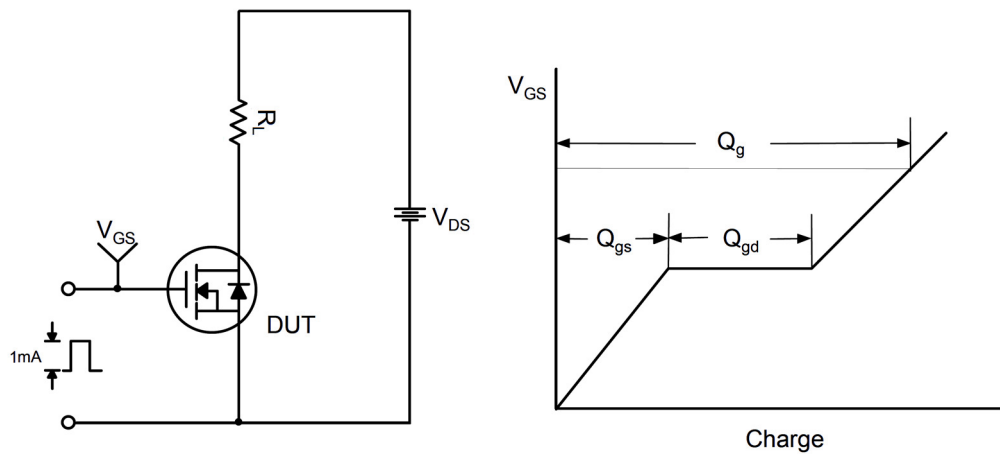


Figure 12. Gate Charge Test Circuit & Waveform

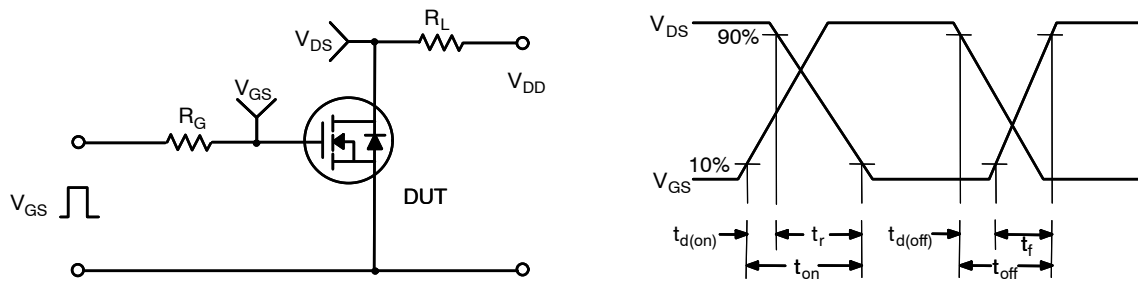


Figure 13. Resistive Switching Test Circuit & Waveforms

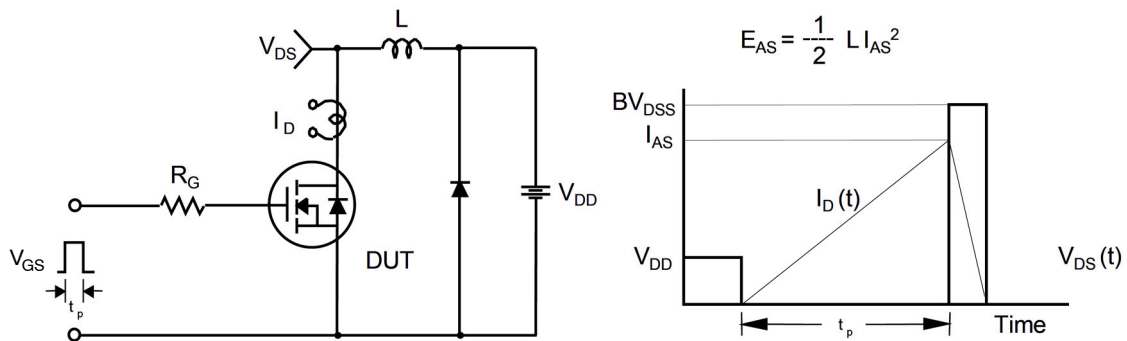


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

FDPF17N60NT

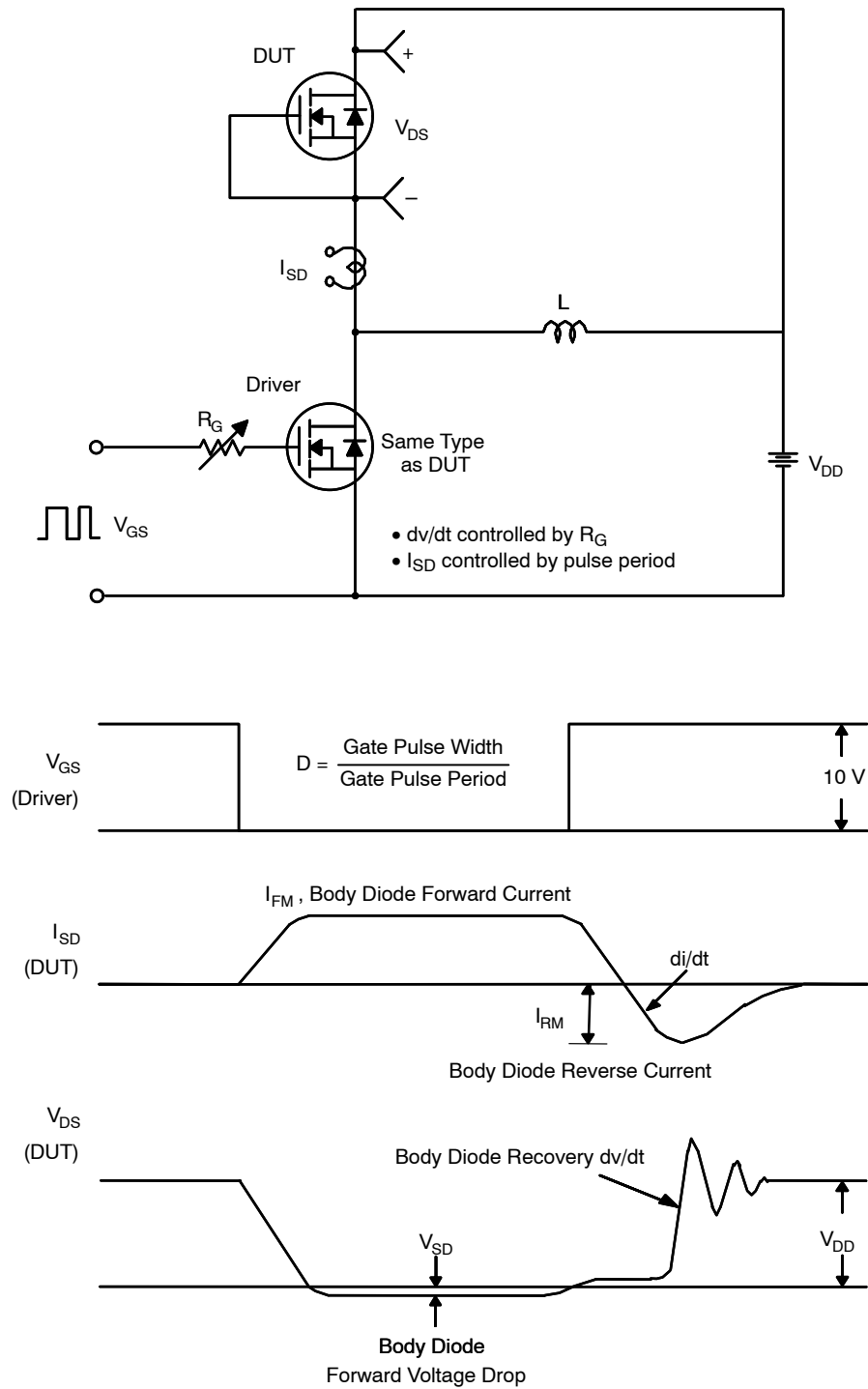
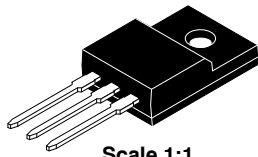


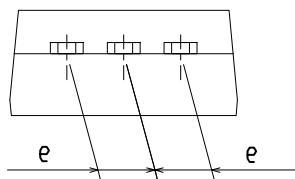
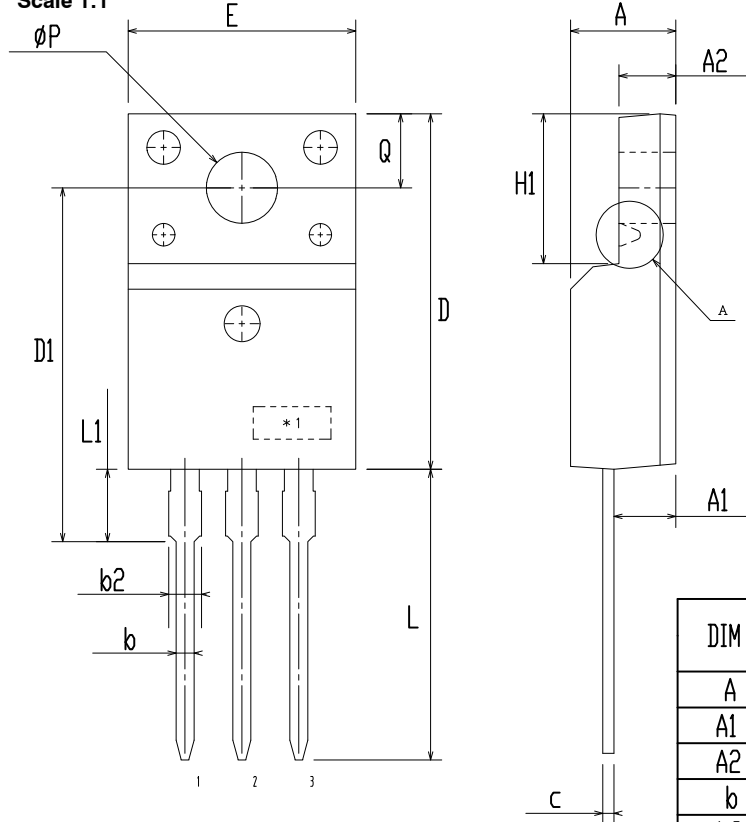
Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

TO-220 Fullpack, 3-Lead / TO-220F-3SG
CASE 221AT
ISSUE B

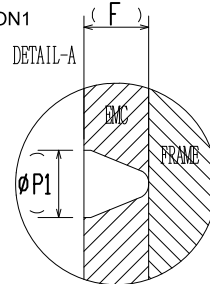
DATE 19 JAN 2021



Scale 1:1



OPTION1



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.50	4.70	4.90
A1	2.56	2.76	2.96
A2	2.34	2.54	2.74
b	0.70	0.80	0.90
b2	~	~	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.60	15.80	16.00
E	9.96	10.16	10.36
e	2.34	2.54	2.74
F	~	0.84	~
H1	6.48	6.68	6.88
L	12.78	12.98	13.18
L1	3.03	3.23	3.43
Ø P	2.98	3.18	3.38
Ø P1	~	1.00	~
Q	3.20	3.30	3.40

NOTES:

A. DIMENSION AND TOLERANCE AS ASME Y14.5-2009

B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUCTIONS.

C. OPTION 1 - WITH SUPPORT PIN HOLE

OPTION 2 - NO SUPPORT PIN HOLE

DOCUMENT NUMBER:	98AON67439E	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 / TO-220F-3SG	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