

# MOSFET – N-Channel, POWERTRENCH®

**250 V, 25 A, 42.5 mΩ**

## FDPF2710T

### Description

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

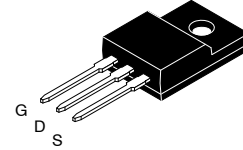
### Features

- $R_{DS(on)} = 36.3 \text{ m}\Omega$  (Typ.) @  $V_{GS} = 10 \text{ V}$ ,  $I_D = 25 \text{ A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- This is a Pb-Free Device

### Applications

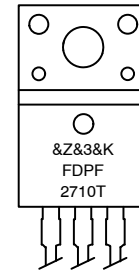
- Consumer Appliances
- Synchronous Rectification

$V_{DS}$	$R_{DS(on)}$ MAX	$I_D$ MAX
250 V	42.5 mΩ @ 10 V	25 A



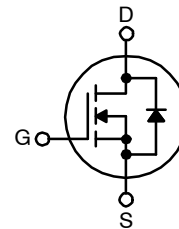
TO-220 Fullpack, 3-Lead /  
TO-220F-3SG  
CASE 221AT

### MARKING DIAGRAM



&Z = Assembly Plant Code  
 &3 = 3-Digit Date Code  
 &K = 2-Digits Lot Run Code  
 FDPF2710T = Specific Device Code

### N-CHANNEL MOSFET



### ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

# FDPF2710T

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Unit
$V_{DS}$	Drain–Source Voltage		250	V
$V_{GS}$	Gate–Source Voltage		$\pm 30$	V
$I_D$	Drain Current	Continuous ( $T_C = 25^\circ\text{C}$ )	25	A
		Continuous ( $T_C = 100^\circ\text{C}$ )	18.8	
$I_{DM}$	Drain Current	Pulsed (Note 1)	100	A
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)		145	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ (Note 3)		4.5	V/ns
$P_D$	Power Dissipation	( $T_C = 25^\circ\text{C}$ )	62.5	W
		Derate above $25^\circ\text{C}$	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 Purpose, $1/8"$ 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.  $L = 1\text{ mH}$ ,  $I_{AS} = 17\text{ A}$ ,  $V_{DD} = 50\text{ V}$ ,  $R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$ .
3.  $I_{SD} \leq 50\text{ A}$ ,  $di/dt \leq 200\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$ .

## THERMAL CHARACTERISTICS

Symbol	Parameter	FDP20N50	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	

# FDPF2710T

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA, T <sub>J</sub> = 25°C	250	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C	–	0.25	–	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 250 V, V <sub>GS</sub> = 0 V V <sub>DS</sub> = 250 V, V <sub>GS</sub> = 0 V, T <sub>C</sub> = 125°C	– –	– –	10 500	μA μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V	–	–	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = –30 V, V <sub>DS</sub> = 0V	–	–	–100	nA

### ON CHARACTERISTICS

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	3.0	3.9	5.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 25 A	–	36.3	42.5	Ω
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 25 A	–	63	–	S

### DYNAMIC CHARACTERISTICS

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	–	5470	7280	pF
C <sub>oss</sub>	Output Capacitance		–	426	567	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		–	97	146	pF

### SWITCHING CHARACTERISTICS

t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 125 V, I <sub>D</sub> = 50 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 25 Ω (Note 4)	–	80	170	ns
t <sub>r</sub>	Turn-On Rise Time		–	252	514	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		–	112	234	ns
t <sub>f</sub>	Turn-Off Fall Time		–	154	318	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 125 V, I <sub>D</sub> = 50 A, V <sub>GS</sub> = 10 V (Note 4)	–	78	101	nC
Q <sub>gs</sub>	Gate-Source Charge		–	34	–	nC
Q <sub>gd</sub>	Gate-Drain Charge		–	18	–	nC

### DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		–	–	25	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		–	–	150	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 25 A	–	–	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 50 A, dI <sub>F</sub> /dt = 130 A/μs	–	163	–	ns
Q <sub>rr</sub>	Reverse Recovery Charge		–	1.3	–	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

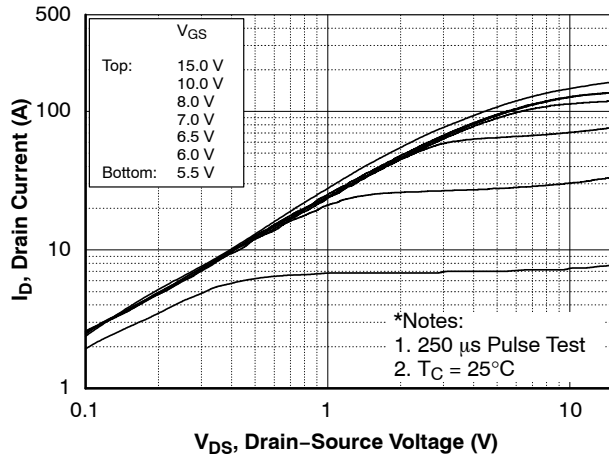


Figure 1. On-Region Characteristics

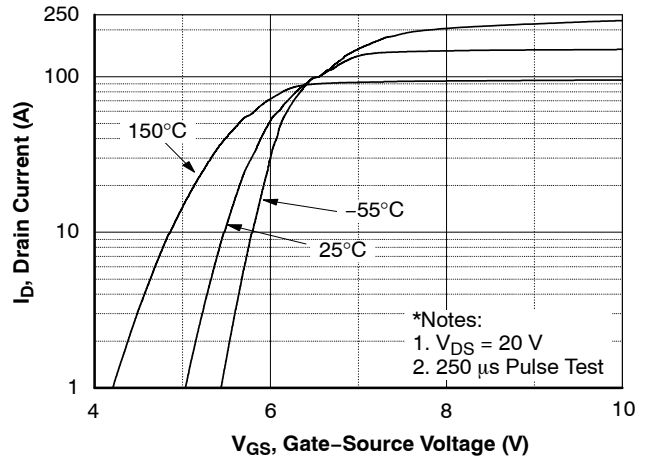


Figure 2. Transfer Characteristics

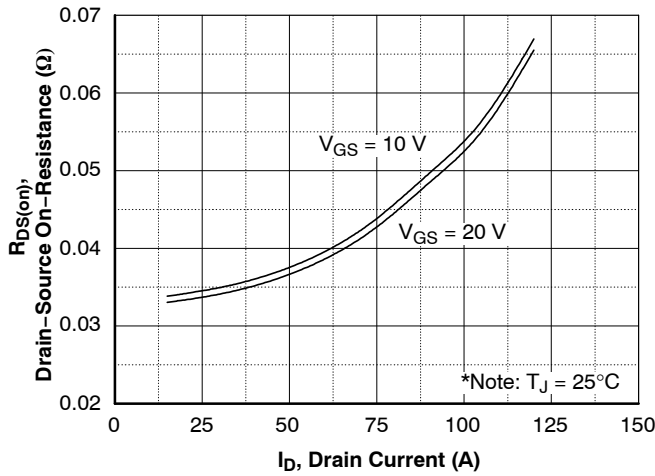


Figure 3. On-Resistance Variation vs. Drain Current and Gate voltage

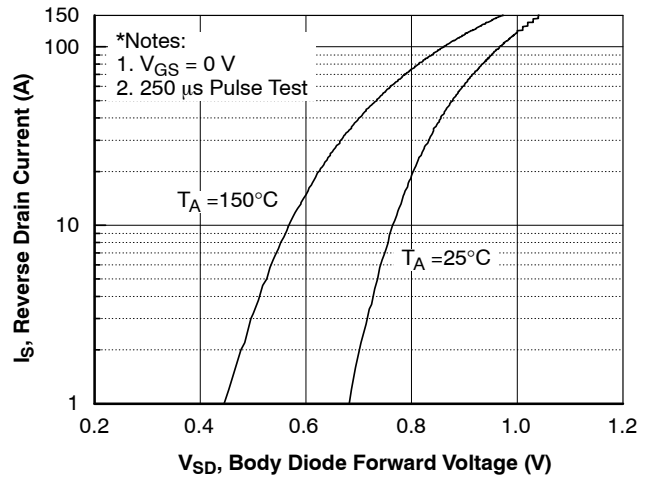


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

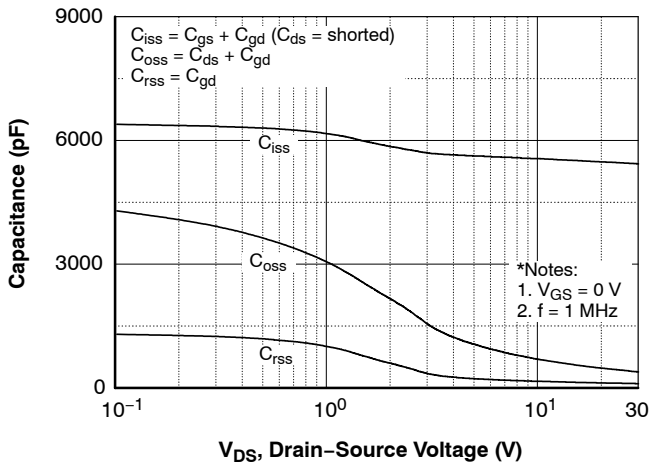


Figure 5. Capacitance Characteristics

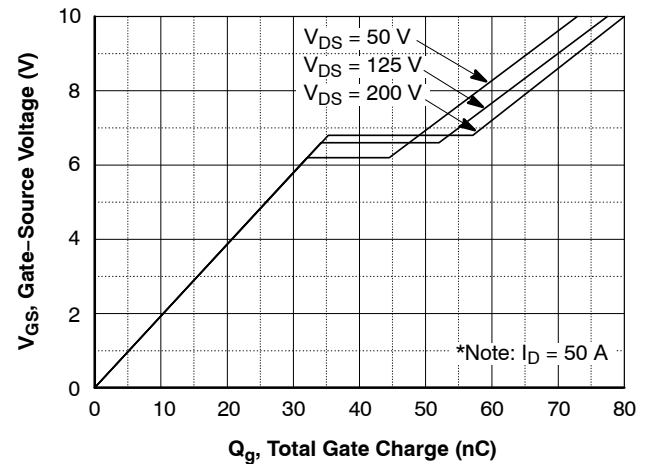


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

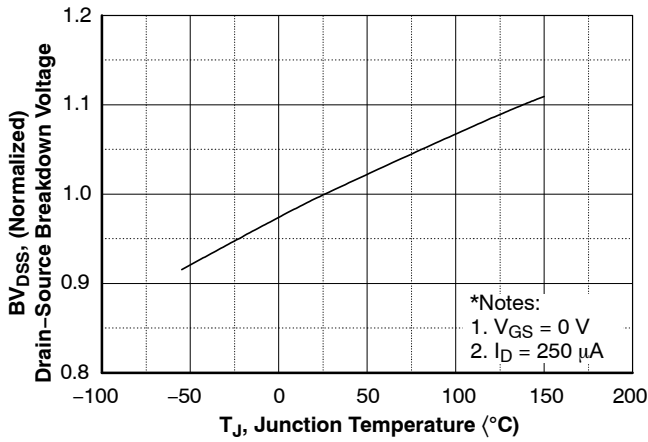


Figure 7. Breakdown Voltage Variation vs. Temperature

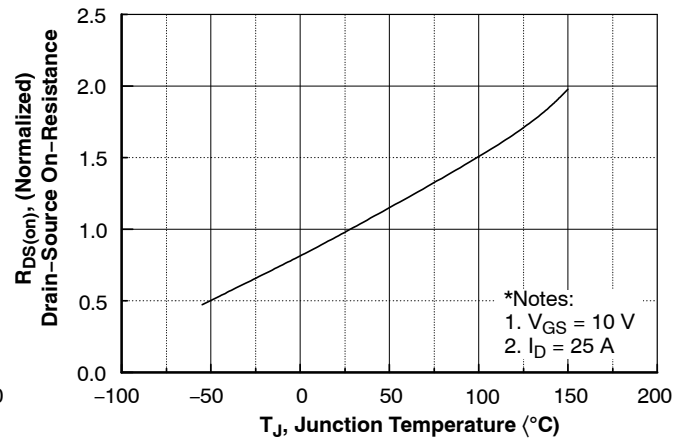


Figure 8. On-Resistance Variation vs. Temperature

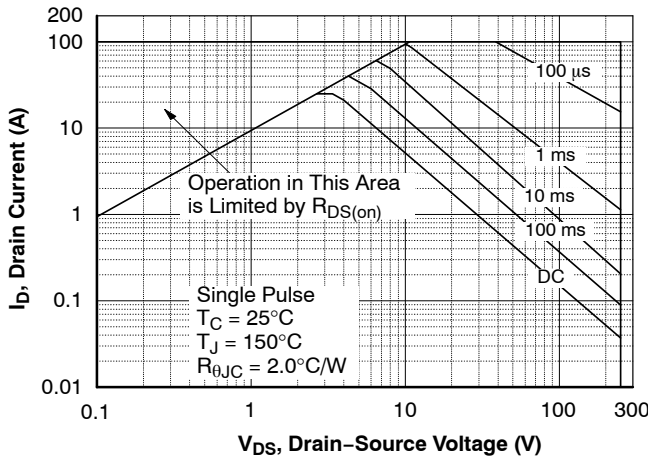


Figure 9. Maximum Safe Operating Area

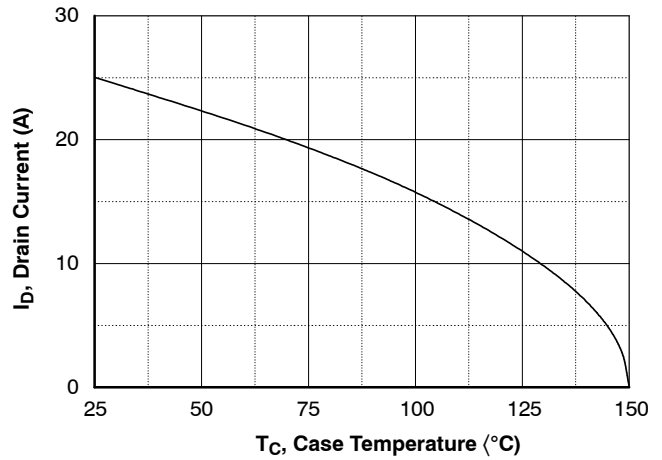


Figure 10. Maximum Drain Current vs. Case Temperature

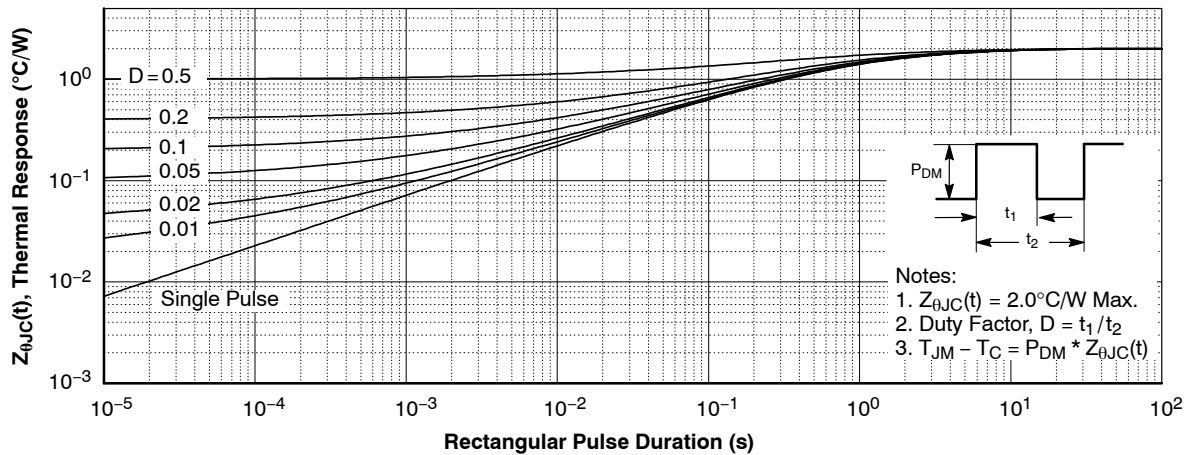


Figure 11. Transient Thermal Response Curve

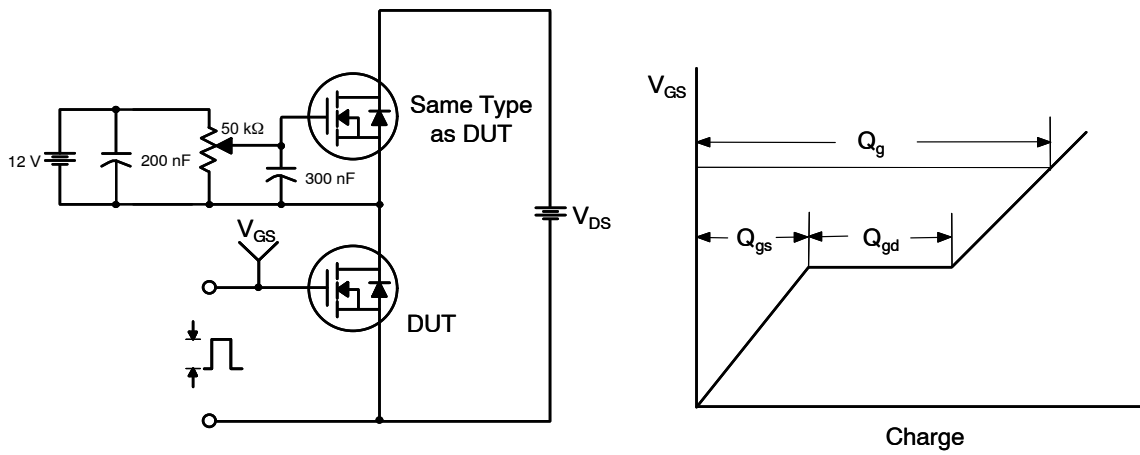


Figure 12. Gate Charge Test Circuit & Waveform

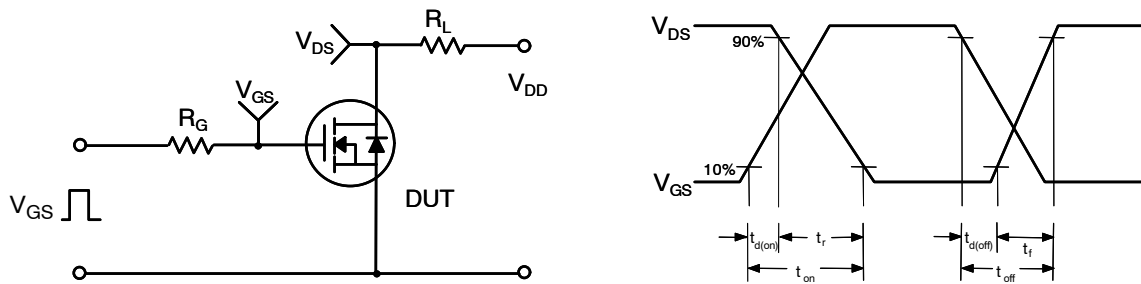


Figure 13. Resistive Switching Test Circuit & Waveforms

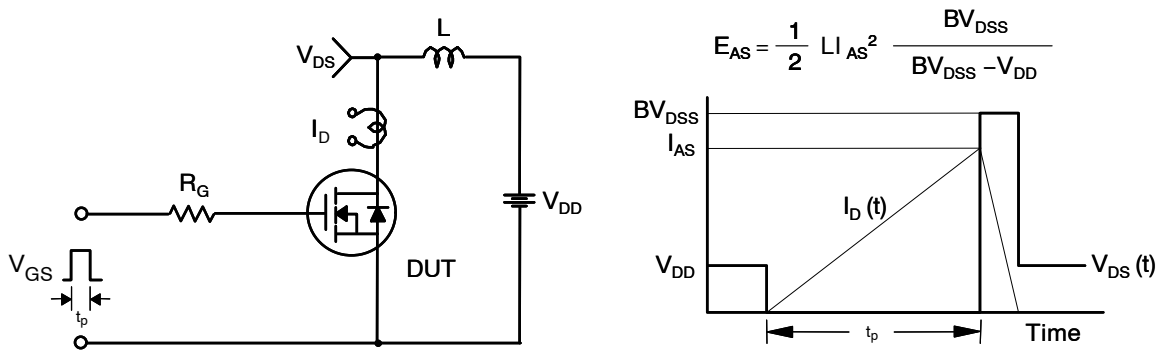


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

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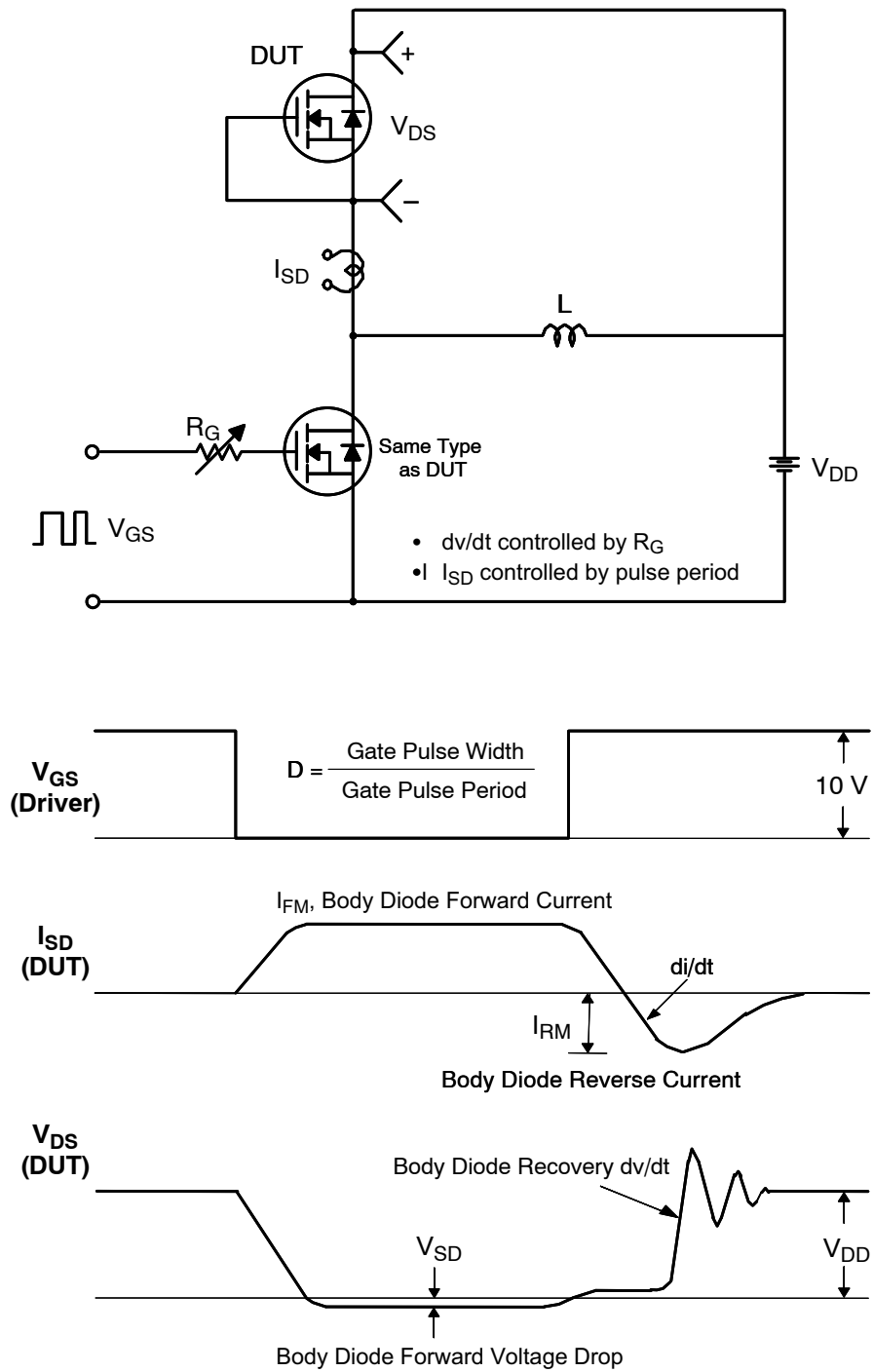


Figure 15. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

## FDPF2710T

### PACKAGE MARKING AND ORDERING INFORMATION

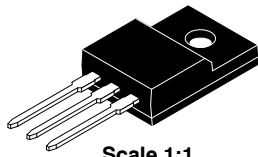
Device	Device Marking	Package	Quantity
FDPF2710T	FDPF2710T	TO-220 Fullpack, 3-Lead / TO-220F-3SG	50 Units / Tube

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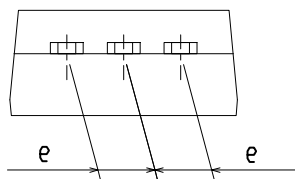
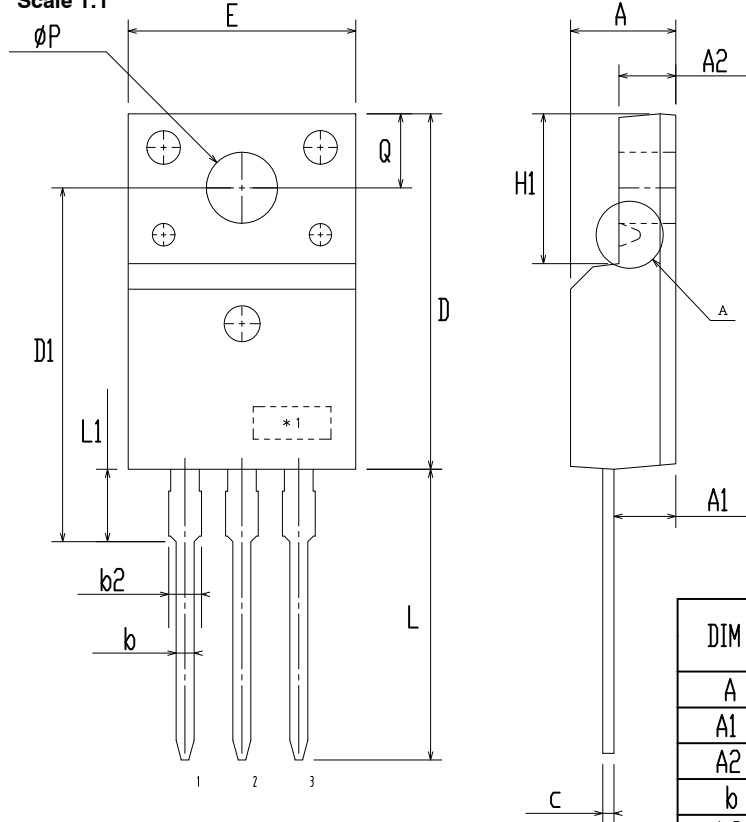


**TO-220 Fullpack, 3-Lead / TO-220F-3SG**  
**CASE 221AT**  
**ISSUE B**

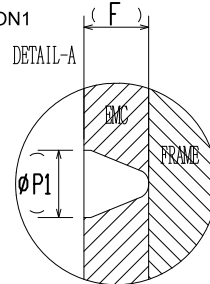
DATE 19 JAN 2021



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

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