

# MOSFET – N-Channel, POWERTRENCH®

**100 V, 75 A, 10 mΩ**

## FDP100N10

### 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

- $R_{DS(on)} = 8.2 \text{ m}\Omega$  (Typ.) @  $V_{GS} = 10 \text{ V}$ ,  $I_D = 75 \text{ A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- This Device is Pb-Free Halide, Free and RoHS Compliant

### Applications

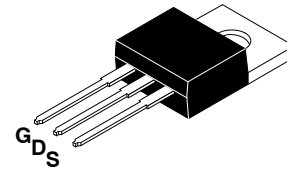
- Synchronous Rectification for ATX / Sever / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter

### ABSOLUTE MAXIMUM RATINGS

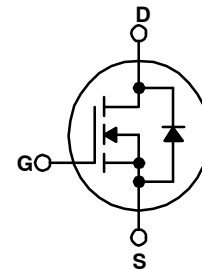
( $T_C = 25^\circ\text{C}$  unless otherwise noted.)

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain to Source Voltage	100	V
$V_{GSS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_C = 75^\circ\text{C}$ )	75	A
$I_{DM}$	Drain Current – Pulsed (Note 1)	300	A
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	365	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ (Note 3)	6	V/ns
$P_D$	Power Dissipation – ( $T_C = 25^\circ\text{C}$ ) – Derate Above $25^\circ\text{C}$	208 1.4	W 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 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.



TO-220-3LD  
CASE 340AT



### MARKING DIAGRAM

&Z&3&K FDP 100N10
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&Z = Assembly Plant Code  
 &3 = 3-Date Date Code  
 &K = 2-Date Lot Run Traceability Code  
 FDP100N10 = Specific Device Code

### ORDERING INFORMATION

Device	Package	Shipping
FDP100N10	TO-220-3 FullPack	800 Units / Tube

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

# FDP100N10

## THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.72	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\ \mu\text{A}$ , $V_{GS} = 0\ \text{V}$ , $T_J = 25^\circ\text{C}$	100	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$	–	0.1	–	V/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 100\ \text{V}$ , $V_{GS} = 0\ \text{V}$	–	–	1	$\mu\text{A}$
		$V_{DS} = 100\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $T_C = 150^\circ\text{C}$	–	–	500	
$I_{GSS}$	Gate to Body Leakage Current	$V_{GS} = \pm 20\ \text{V}$ , $V_{DS} = 0\ \text{V}$	–	–	$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\ \mu\text{A}$	2.5	–	4.5	V
$R_{DS(on)}$	Static Drain to Source On-Resistance	$V_{GS} = 10\ \text{V}$ , $I_D = 75\ \text{A}$	–	8.2	10	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\ \text{V}$ , $I_D = 37.5\ \text{A}$	–	110	–	S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$	–	5500	7300	pF
$C_{oss}$	Output Capacitance		–	530	710	pF
$C_{rss}$	Reverse Transfer Capacitance		–	220	325	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{DS} = 50\ \text{V}$ , $I_D = 75\ \text{A}$ , $V_{GS} = 10\ \text{V}$ (Note 4)	–	76	100	nC
$Q_{gs}$	Gate to Source Gate Charge		–	30	–	nC
$Q_{gd}$	Gate to Drain “Miller” Charge		–	20	–	nC

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\ \text{V}$ , $I_D = 75\ \text{A}$ , $V_{GS} = 10\ \text{V}$ , $R_G = 25\ \Omega$ (Note 4)	–	70	150	ns
$t_r$	Turn-On Rise Time		–	265	540	ns
$t_{d(off)}$	Turn-Off Delay Time		–	125	260	ns
$t_f$	Turn-Off Fall Time		–	115	240	ns

### Drain-Source Diode Characteristics and Maximum Ratings

I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		–	–	75	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		–	–	300	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 75 A	–	–	1.25	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 75 A, dI <sub>F</sub> /dt = 100 A/μs	–	71	–	ns
Q <sub>rr</sub>	Reverse Recovery Charge		–	164	–	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.

### NOTES:

1. Repetitive Rating: Pulse-width limited by maximum junction temperature.
2.  $L = 0.13\ \text{mH}$ ,  $I_{AS} = 75\ \text{A}$ ,  $V_{DD} = 25\ \text{V}$ ,  $R_G = 25\ \Omega$  starting  $T_J = 25^\circ\text{C}$ .
3.  $I_{SD} \leq 75\ \text{A}$ ,  $di/dt \leq 200\ \text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , starting  $T_J = 25^\circ\text{C}$ .
4. Essentially independent of operating temperature typical characteristics.

## TYPICAL CHARACTERISTICS

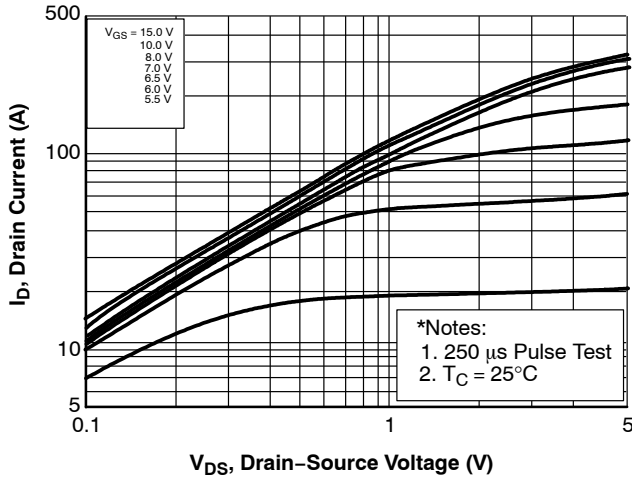


Figure 1. On-Region Characteristics

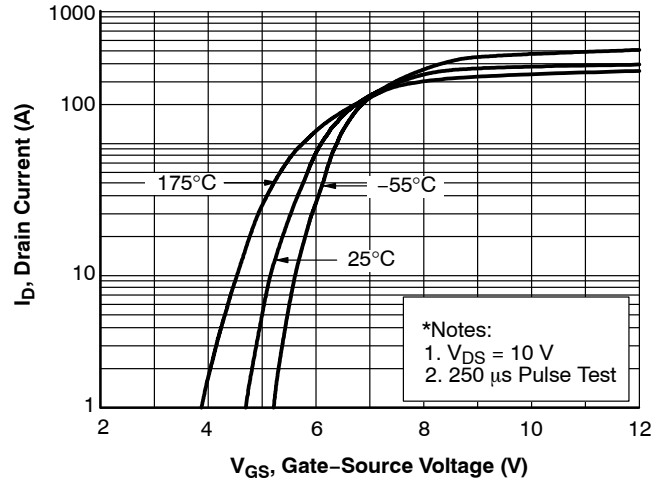


Figure 2. Transfer Characteristics

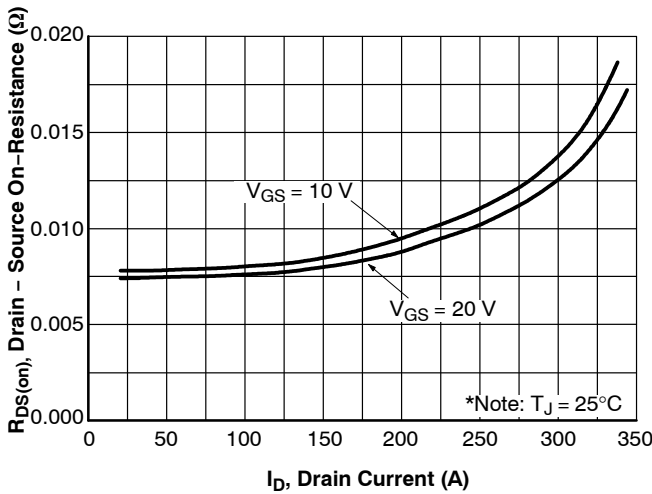


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

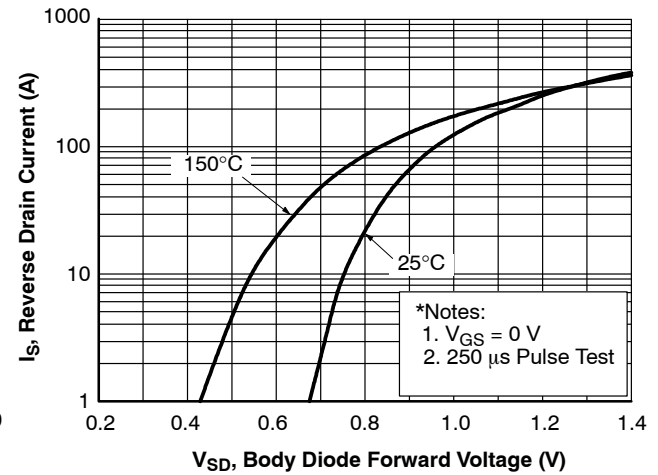


Figure 4. Body Diode Forward Voltage Variation vs Source Current and Temperature

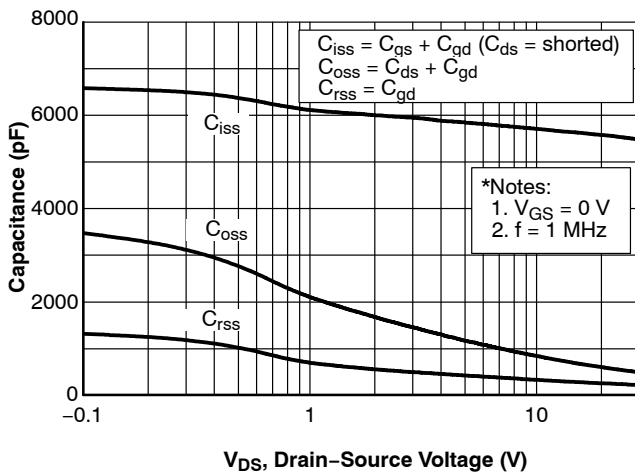


Figure 5. Capacitance Characteristics

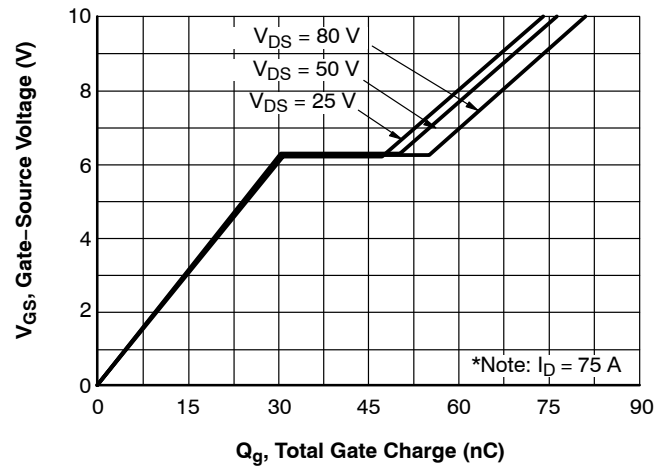


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS (continued)

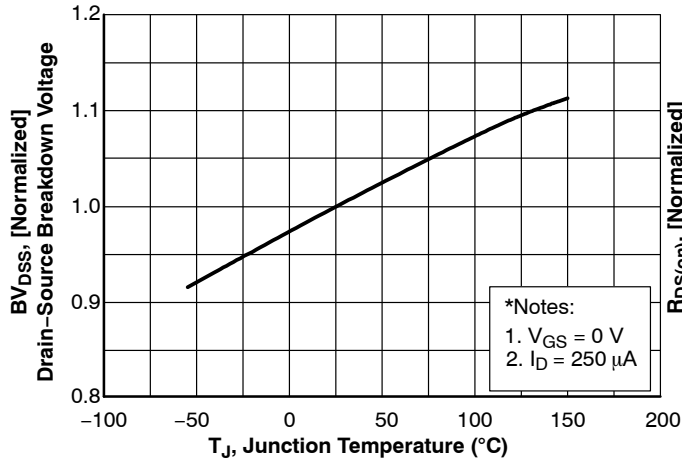


Figure 7. Breakdown Voltage Variation vs Temperature

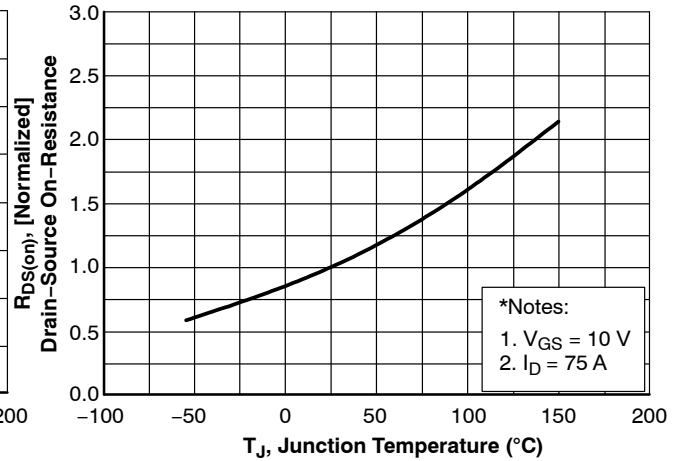


Figure 8. On-Resistance Variation vs Temperature

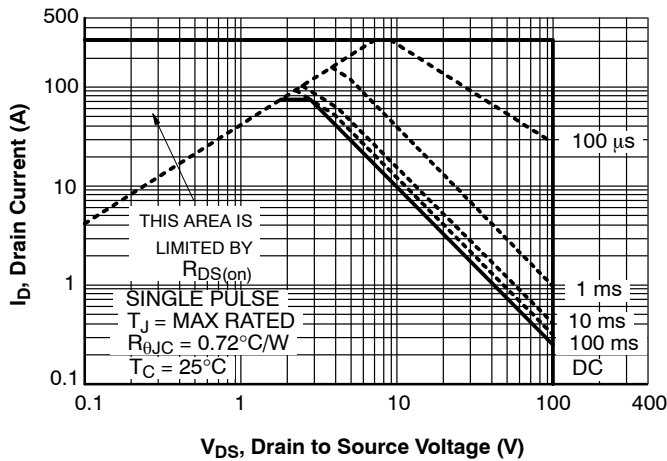


Figure 9. Maximum Safe Operating Area

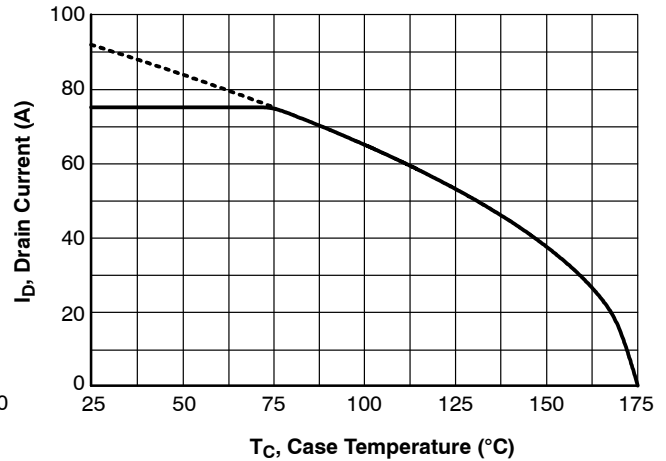


Figure 10. Maximum Drain Current vs. Case Temperature

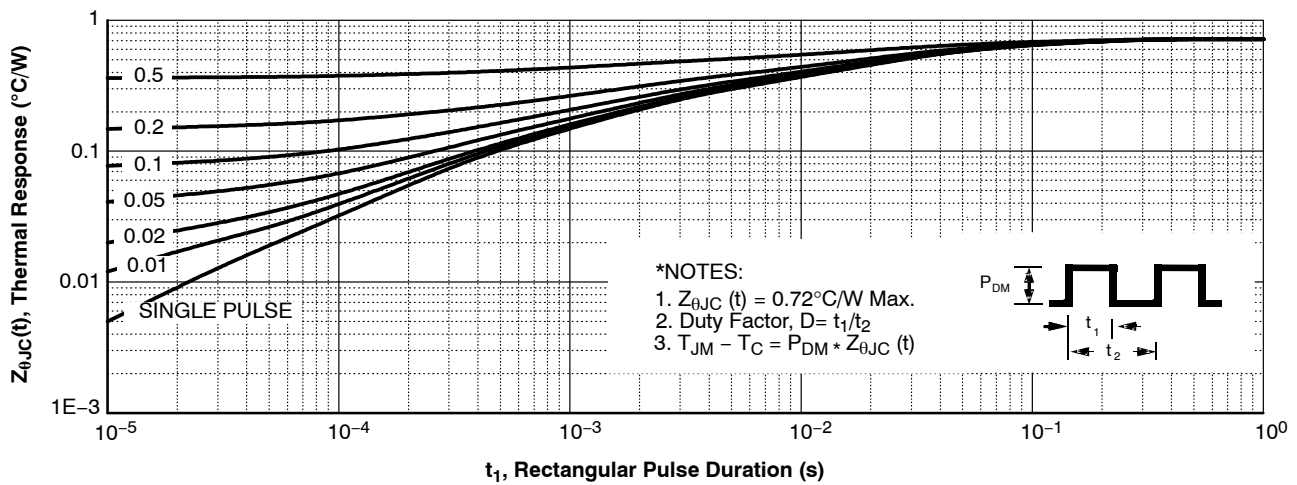


Figure 11. Transient Thermal Response Curve

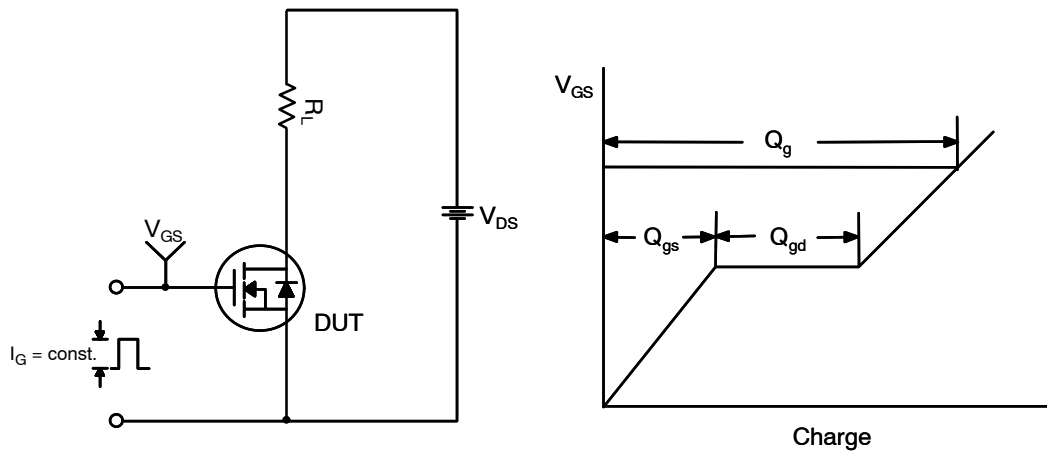


Figure 12. Gate Charge Test Circuit & Waveform

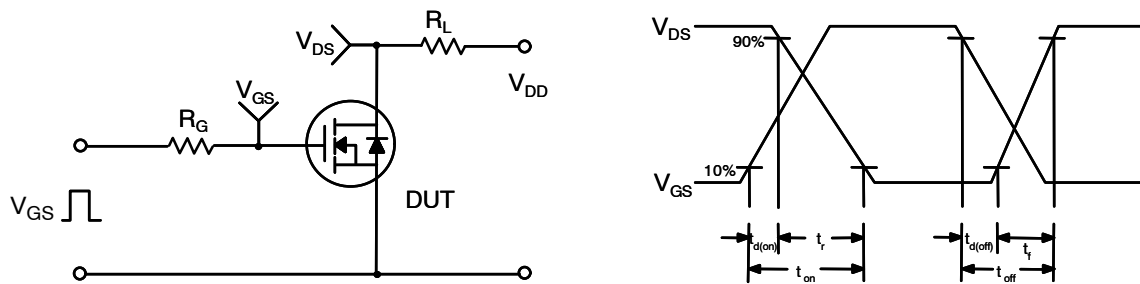


Figure 13. Resistive Switching Test Circuit & Waveforms

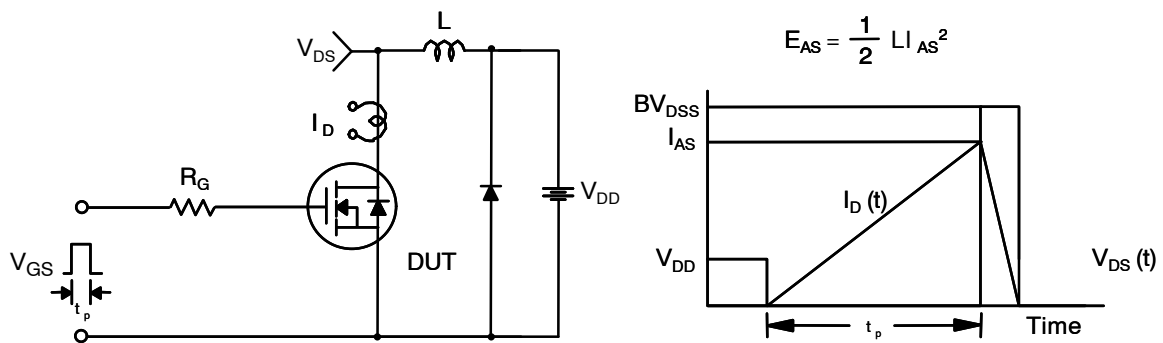
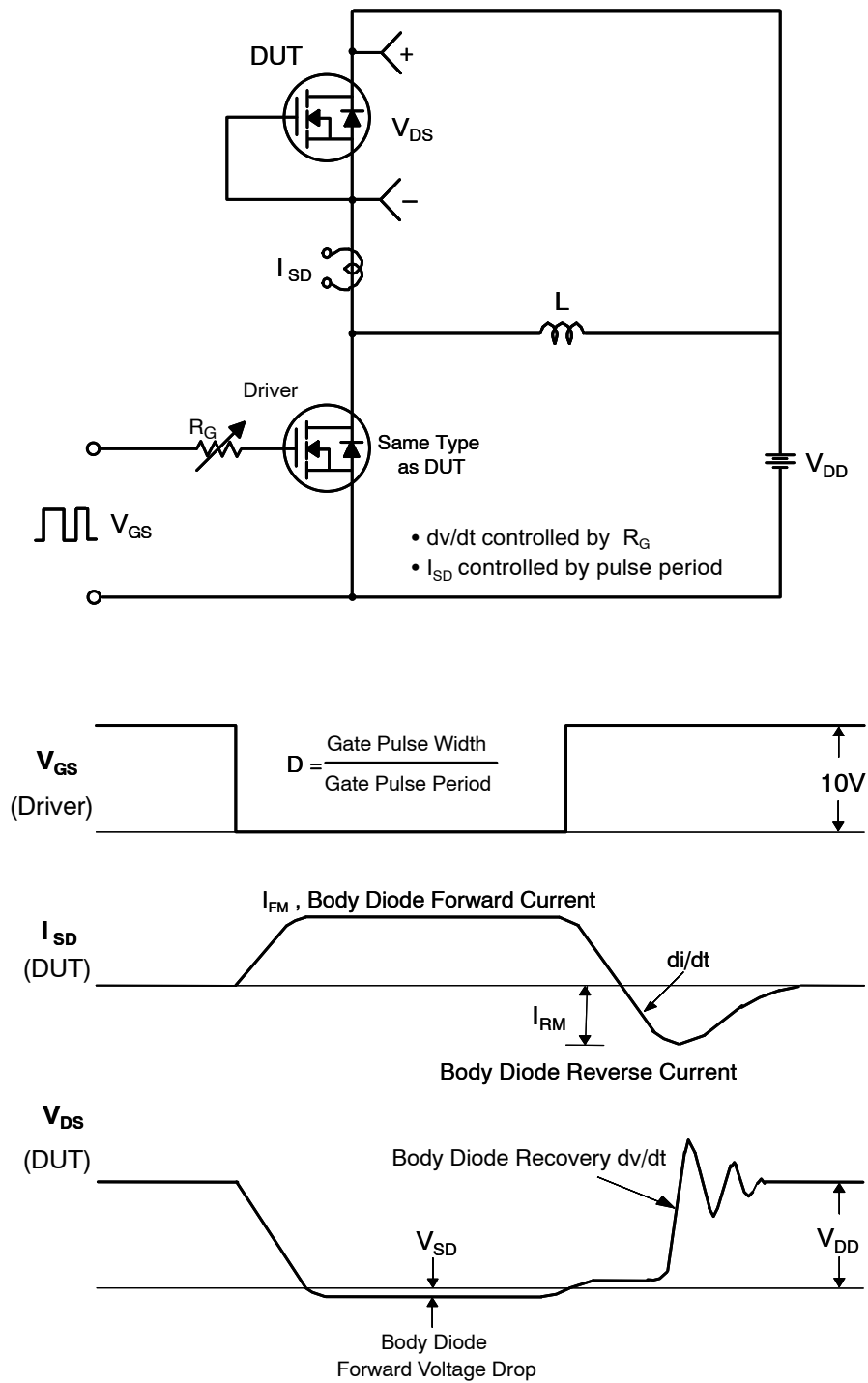
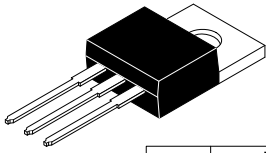


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

# FDP100N10



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



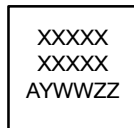
TO-220-3LD  
CASE 340AT  
ISSUE B

DATE 08 AUG 2022

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	4.00	--	4.70
A1	SEE NOTE "F"		
A2	2.10	--	2.85
b	0.55	--	1.00
b2	1.10	--	1.62
b4	1.42	--	1.62
c	0.36	--	0.60
D	13.90	--	16.30
D1	8.13	--	9.40
D2	11.50	--	14.30
D3	15.42	--	16.51
E	9.65	--	10.67
E1	7.59	--	8.65
e	2.40	--	2.67
H1	6.06	--	6.69
L	12.70	--	14.04
L1	2.70	--	4.10
P	3.50	--	4.00
Q	2.50	--	3.40
z	2.13 REF		
z1	2.06 REF		
θ	3°	--	5°

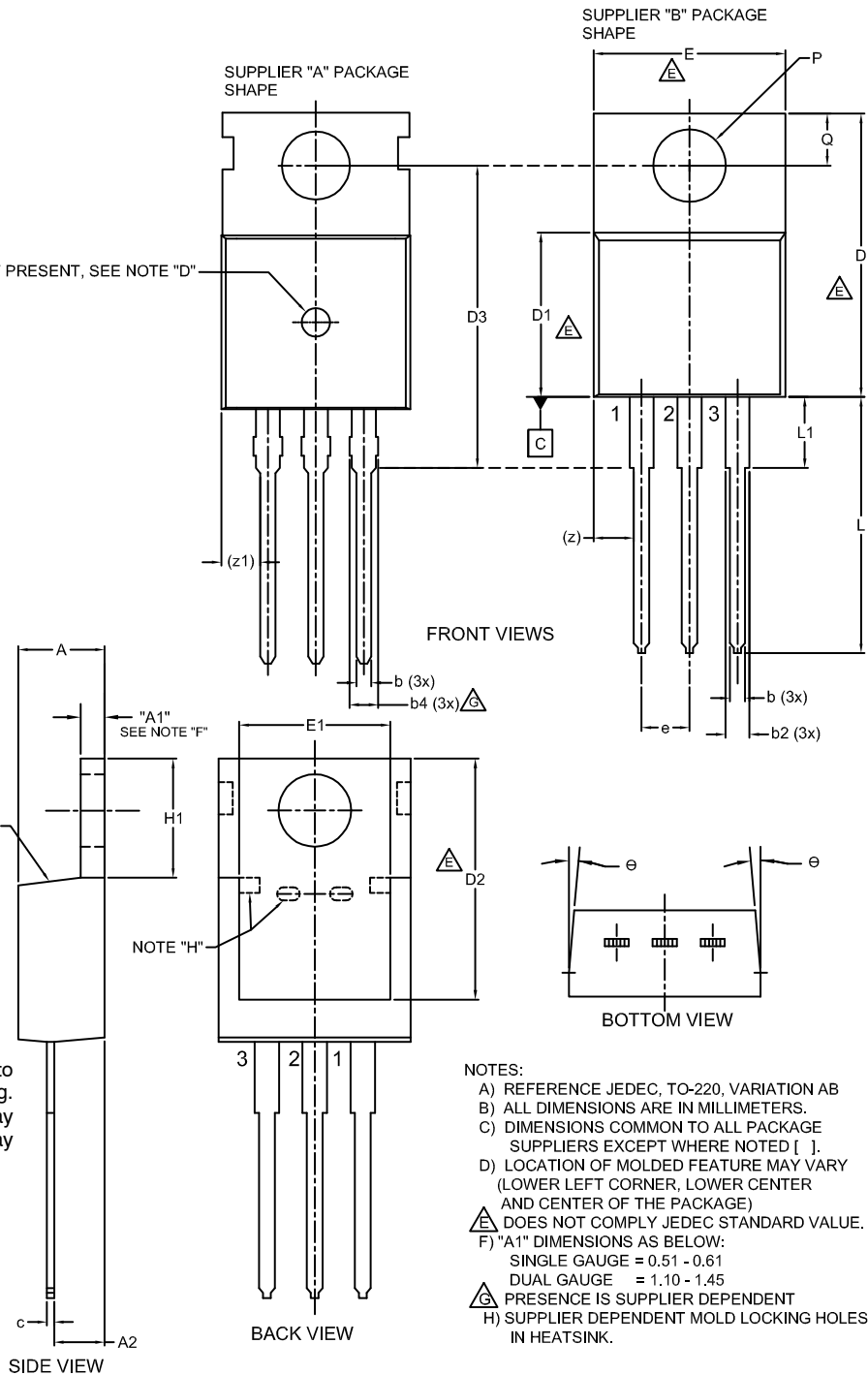
IF PRESENT, SEE NOTE "D"

GENERIC  
MARKING DIAGRAM\*



XXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
ZZ = Assembly Lot Code

\*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.



NOTES:

- A) REFERENCE JEDEC, TO-220, VARIATION AB
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS COMMON TO ALL PACKAGE SUPPLIERS EXCEPT WHERE NOTED [ ].
- D) LOCATION OF MOLDED FEATURE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
- E) DOES NOT COMPLY JEDEC STANDARD VALUE.
- F) "A1" DIMENSIONS AS BELOW:  
SINGLE GAUGE = 0.51 - 0.61  
DUAL GAUGE = 1.10 - 1.45
- G) PRESENCE IS SUPPLIER DEPENDENT
- H) SUPPLIER DEPENDENT MOLD LOCKING HOLES IN HEATSINK.

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