

# MOSFET – N-Channel, POWERTRENCH®

100 V, 57 A, 16 mΩ

## FDI150N10

### 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

- $R_{DS(on)} = 12 \text{ m}\Omega$  (Typ.) @  $V_{GS} = 10 \text{ V}$ ,  $I_D = 49 \text{ A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

### Applications

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

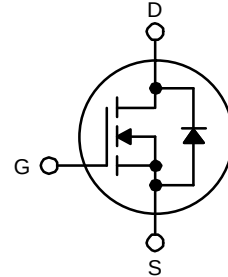
### MOSFET MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ , unless otherwise noted)

| Symbol         | Parameter                                                            | FDI150N10                                  | Unit             |
|----------------|----------------------------------------------------------------------|--------------------------------------------|------------------|
| $V_{DSS}$      | Drain to Source Voltage                                              | 100                                        | V                |
| $V_{GSS}$      | Gate to Source Voltage                                               | $\pm 20$                                   | V                |
| $I_D$          | Drain Current                                                        | – Continuous ( $T_C = 25^\circ\text{C}$ )  | 57               |
|                |                                                                      | – Continuous ( $T_C = 100^\circ\text{C}$ ) | 40               |
| $I_{DM}$       | Drain Current                                                        | – Pulsed (Note 1)                          | 228              |
| $E_{AS}$       | Single Pulsed Avalanche Energy (Note 2)                              | 132                                        | mJ               |
| $dv/dt$        | Peak Diode Recovery $dv/dt$ (Note 3)                                 | 7.5                                        | V/ns             |
| $P_D$          | Power Dissipation                                                    | ( $T_C = 25^\circ\text{C}$ )               | 110              |
|                |                                                                      | – Derate Above $25^\circ\text{C}$          | 0.88             |
| $T_J, T_{STG}$ | 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                                        | $^\circ\text{C}$ |

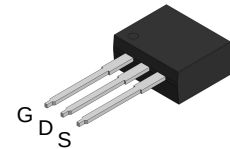
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2.  $L = 0.11 \text{ mH}$ ,  $I_{AS} = 49 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$ ,  $R_G = 25 \Omega$ , starting  $T_J = 25^\circ\text{C}$ .
3.  $I_{SD} \leq 49 \text{ A}$ ,  $di/dt \leq 200 \text{ A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , starting  $T_J = 25^\circ\text{C}$ .

| $V_{DSS}$ | $R_{DS(on)} \text{ MAX}$ | $I_D \text{ MAX}$ |
|-----------|--------------------------|-------------------|
| 100 V     | 16 mΩ @ 10 V             | 57 A              |

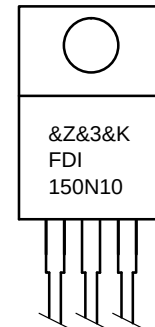


P-Channel MOSFET



I2PAK  
CASE 418AV

### MARKING DIAGRAM



&Z = Assembly Plant Code  
 &3 = 3-Digit Plant Code  
 &K = 2-Digits Lot Run Traceability Code  
 FDI150N10 = Specific Device Code

### ORDERING INFORMATION

| Device    | Package | Shipping         |
|-----------|---------|------------------|
| FDI150N10 | I2PAK   | 800 Units / Tube |

# FDI150N10

## THERMAL CHARACTERISTICS

| Symbol          | Parameter                                     | FDI150N10 | Unit |
|-----------------|-----------------------------------------------|-----------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max.    | 1.13      | °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 |
|--------|-----------|-----------------|-----|-----|-----|------|
|--------|-----------|-----------------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                |                                           |                                                                               |     |     |           |               |
|--------------------------------|-------------------------------------------|-------------------------------------------------------------------------------|-----|-----|-----------|---------------|
| $BV_{DSS}$                     | Drain to Source Breakdown Voltage         | $I_D = 250 \mu\text{A}$ , $V_{GS} = 0 \text{ V}$ , $T_C = 25^\circ\text{C}$   | 100 | –   | –         | V             |
| $\Delta BV_{DSS} / \Delta T_J$ | 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 | $V_{GS} = 10 \text{ V}$ , $I_D = 49 \text{ A}$ | –   | 12  | 16  | m $\Omega$ |
| $g_{FS}$     | Forward Transconductance             | $V_{DS} = 20 \text{ V}$ , $I_D = 49 \text{ A}$ | –   | 156 | –   | S          |

### DYNAMIC CHARACTERISTICS

|           |                              |                                                                        |   |      |      |    |
|-----------|------------------------------|------------------------------------------------------------------------|---|------|------|----|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 25 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$ | – | 3580 | 4760 | pF |
| $C_{oss}$ | Output Capacitance           |                                                                        | – | 340  | 450  | pF |
| $C_{rss}$ | Reverse Transfer Capacitance |                                                                        | – | 140  | 210  | pF |

### SWITCHING CHARACTERISTICS

|              |                               |                                                                                                          |   |     |     |    |
|--------------|-------------------------------|----------------------------------------------------------------------------------------------------------|---|-----|-----|----|
| $t_{d(on)}$  | Turn-On Delay Time            | $V_{DD} = 50 \text{ V}$ , $I_D = 49 \text{ A}$ , $V_{GS} = 10 \text{ V}$ ,<br>$R_G = 25 \Omega$ (Note 4) | – | 47  | 104 | ns |
| $t_r$        | Turn-On Rise Time             |                                                                                                          | – | 164 | 338 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time           |                                                                                                          | – | 86  | 182 | ns |
| $t_f$        | Turn-Off Fall Time            |                                                                                                          | – | 83  | 176 | ns |
| $Q_{g(tot)}$ | Total Gate Charge at 10 V     | $V_{DS} = 80 \text{ V}$ , $I_D = 49 \text{ A}$ , $V_{GS} = 10 \text{ V}$<br>(Note 4)                     | – | 53  | 69  | nC |
| $Q_{gs}$     | Gate to Source Gate Charge    |                                                                                                          | – | 19  | –   | nC |
| $Q_{gd}$     | Gate to Drain "Miller" Charge |                                                                                                          | – | 15  | –   | nC |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|          |                                                          |                                                                                             |   |    |     |    |
|----------|----------------------------------------------------------|---------------------------------------------------------------------------------------------|---|----|-----|----|
| $I_S$    | Maximum Continuous Drain to Source Diode Forward Current |                                                                                             | – | –  | 57  | A  |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                             | – | –  | 228 | A  |
| $V_{SD}$ | Drain to Source Diode Forward Voltage                    | $V_{GS} = 0 \text{ V}$ , $I_{SD} = 49 \text{ A}$                                            | – | –  | 1.3 | V  |
| $t_{rr}$ | Reverse Recovery Time                                    | $V_{GS} = 0 \text{ V}$ , $I_{SD} = 49 \text{ A}$ ,<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$ | – | 41 | –   | ns |
| $Q_{rr}$ | Reverse Recovery Charge                                  |                                                                                             | – | 70 | –   | 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

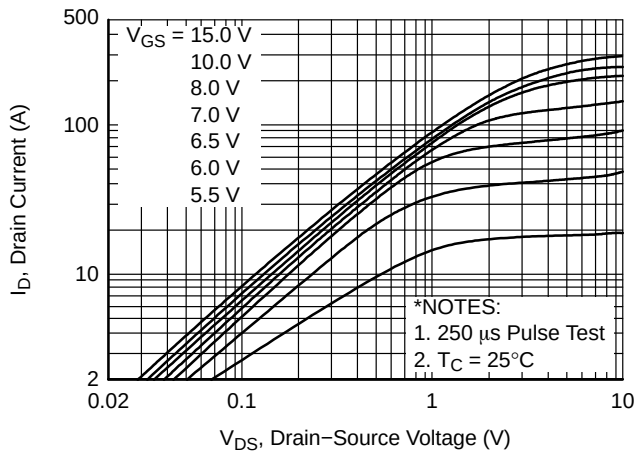


Figure 1. On-Region Characteristics

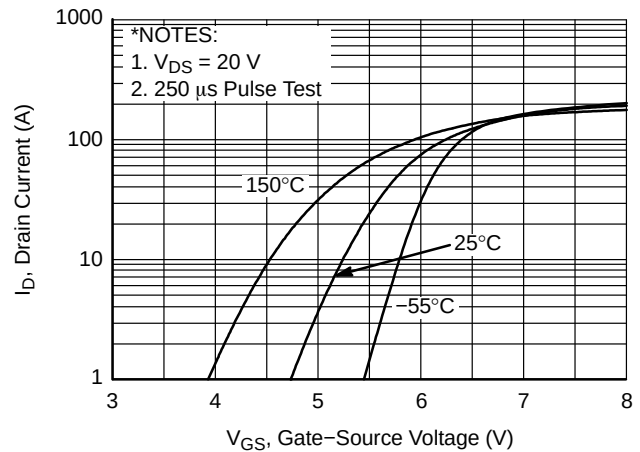


Figure 2. Transfer Characteristics

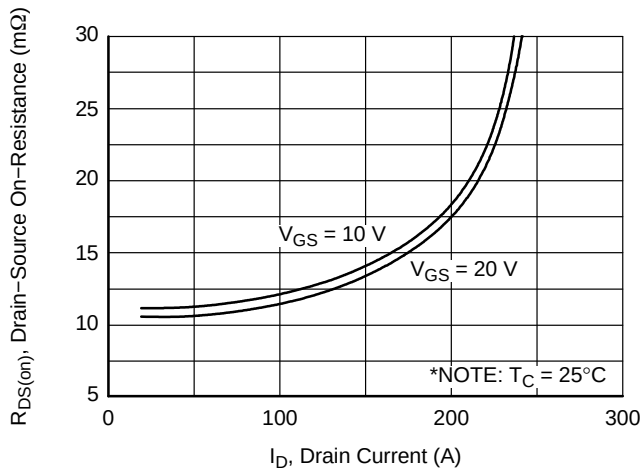


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

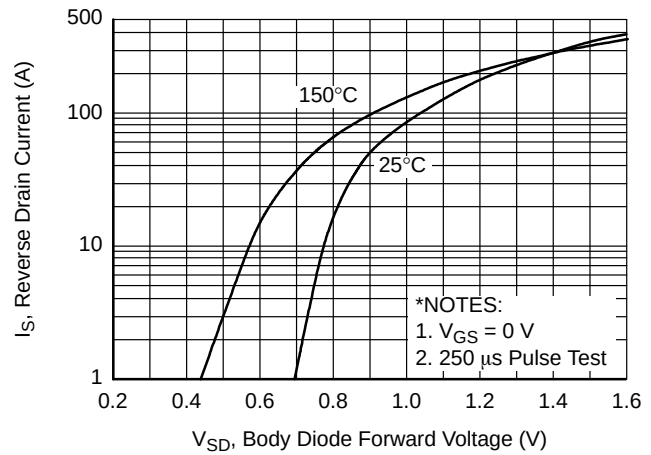


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

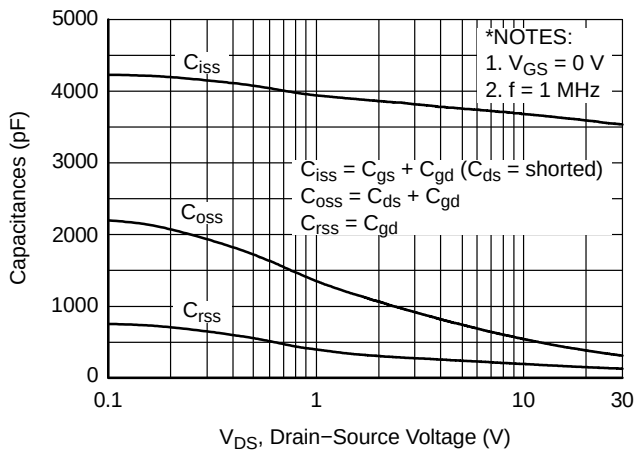


Figure 5. Capacitance Characteristics

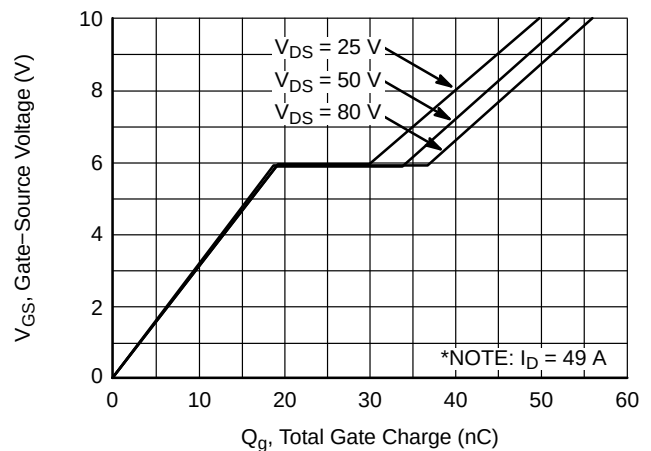


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

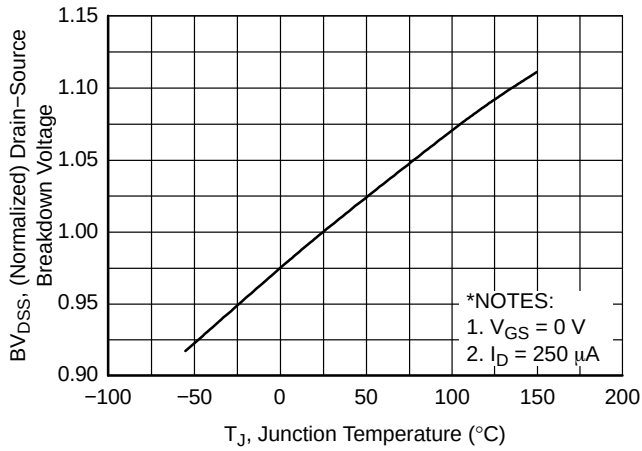


Figure 7. Breakdown Voltage Variation vs. Temperature

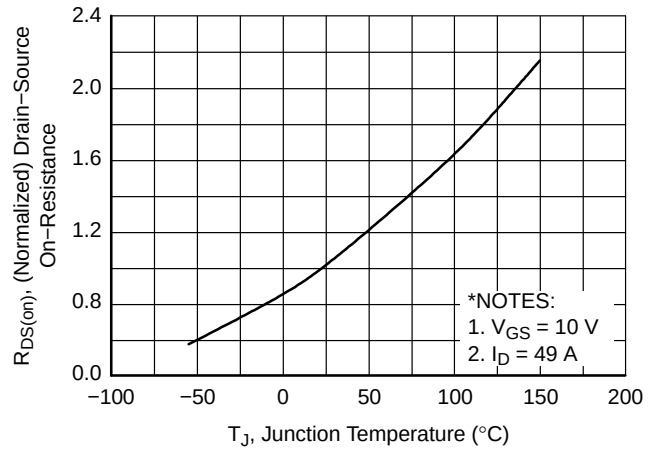


Figure 8. On-Resistance Variation vs. Temperature

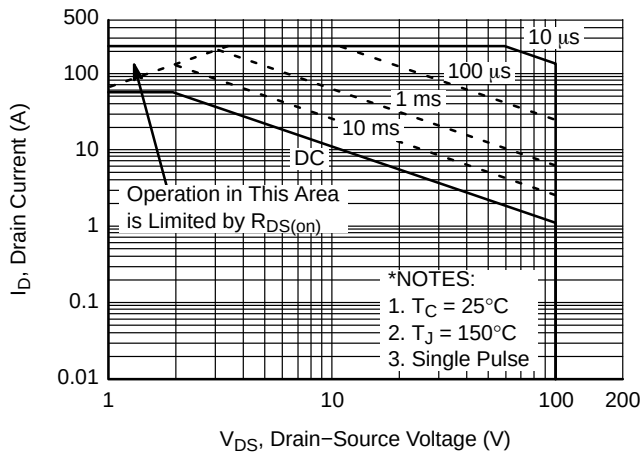


Figure 9. Maximum Safe Operating Area

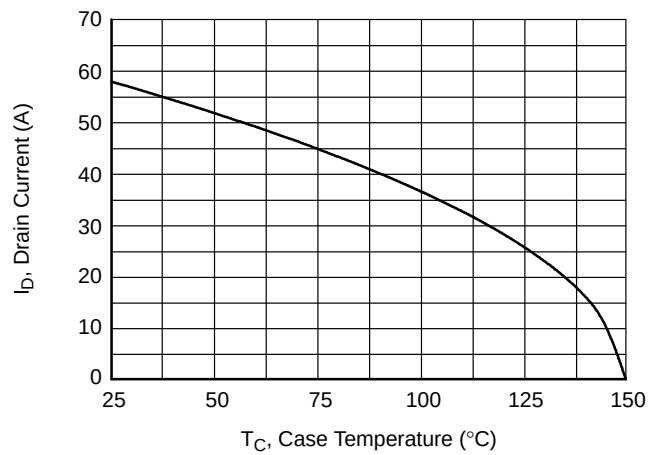


Figure 10. Maximum Drain Current vs. Case Temperature

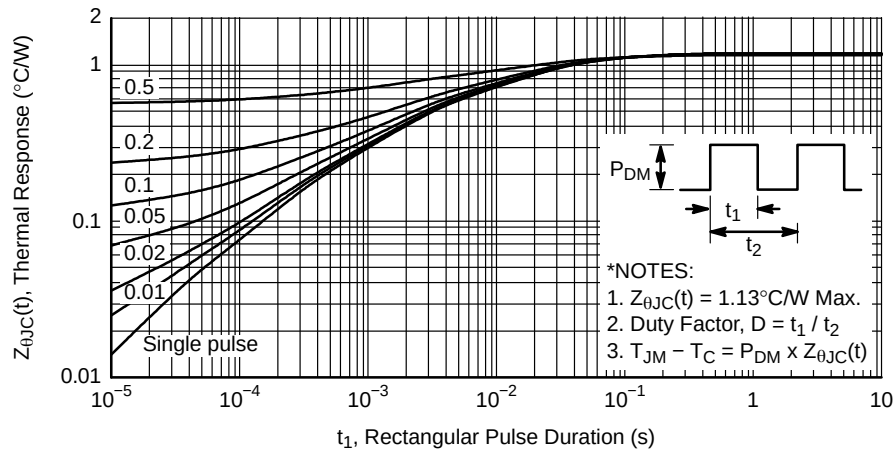


Figure 11. Transient Thermal Response Curve

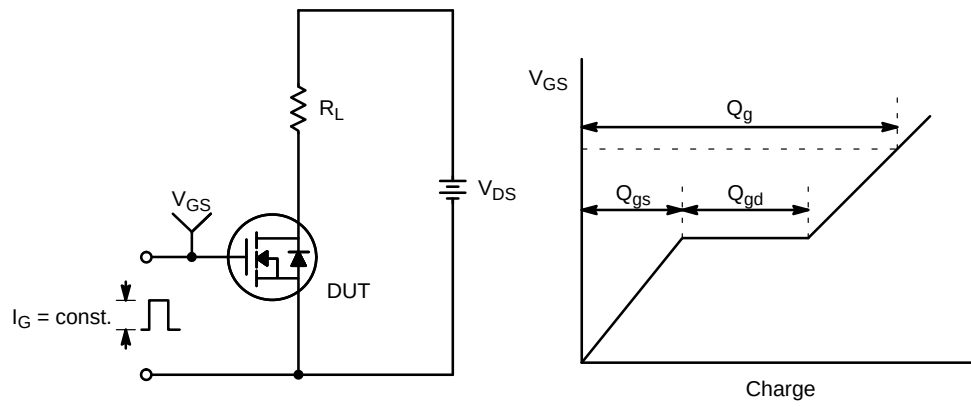


Figure 12. Gate Charge Test Circuit & Waveform

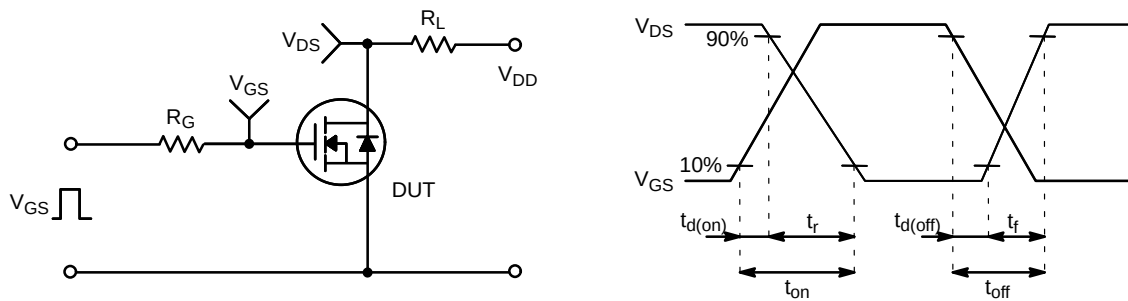


Figure 13. Resistive Switching Test Circuit & Waveforms

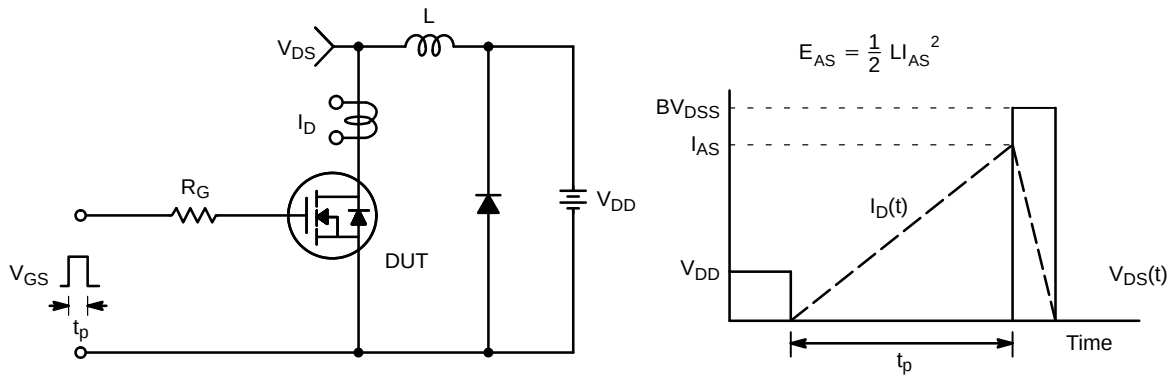
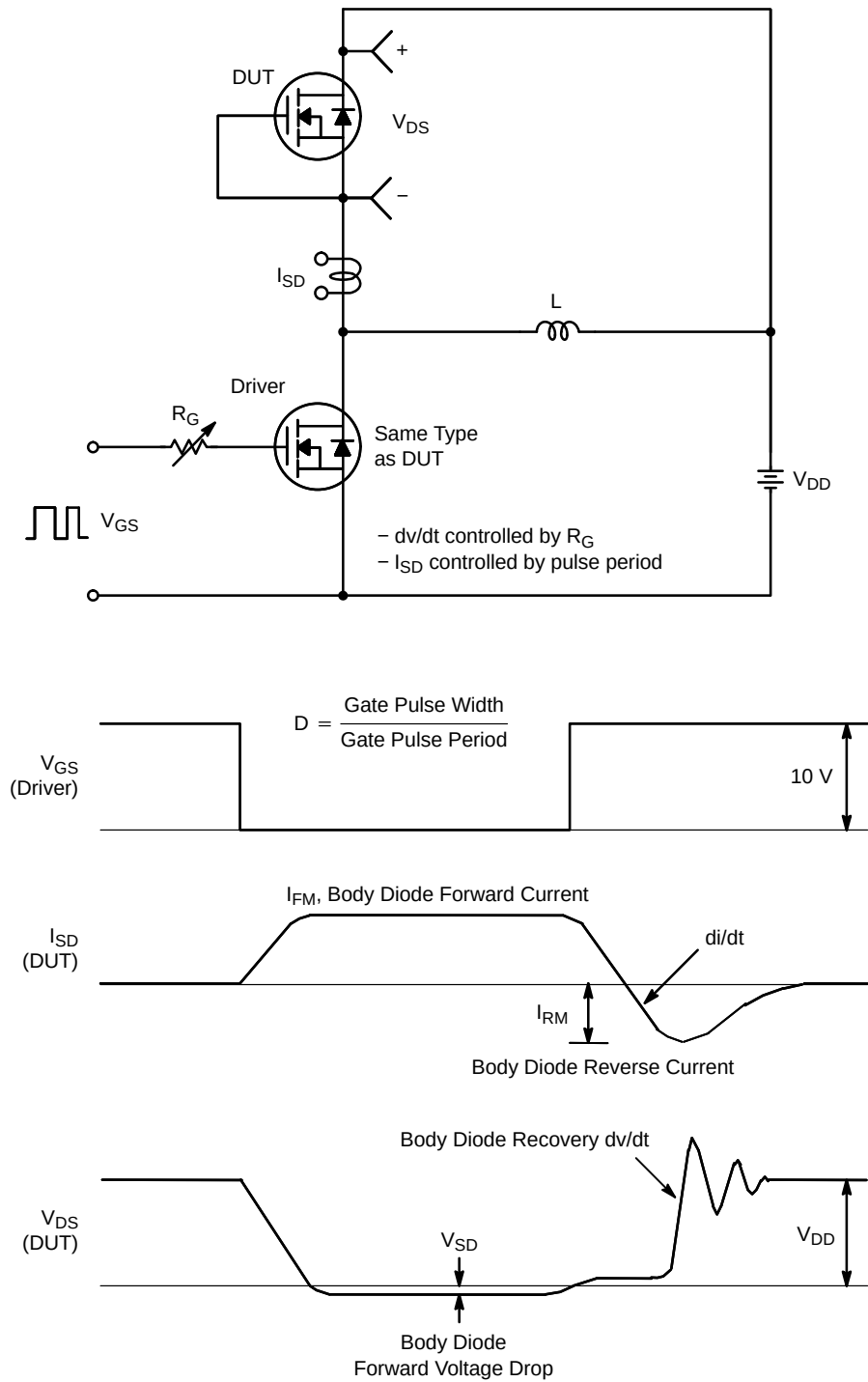
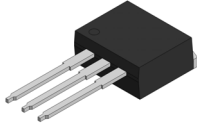


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

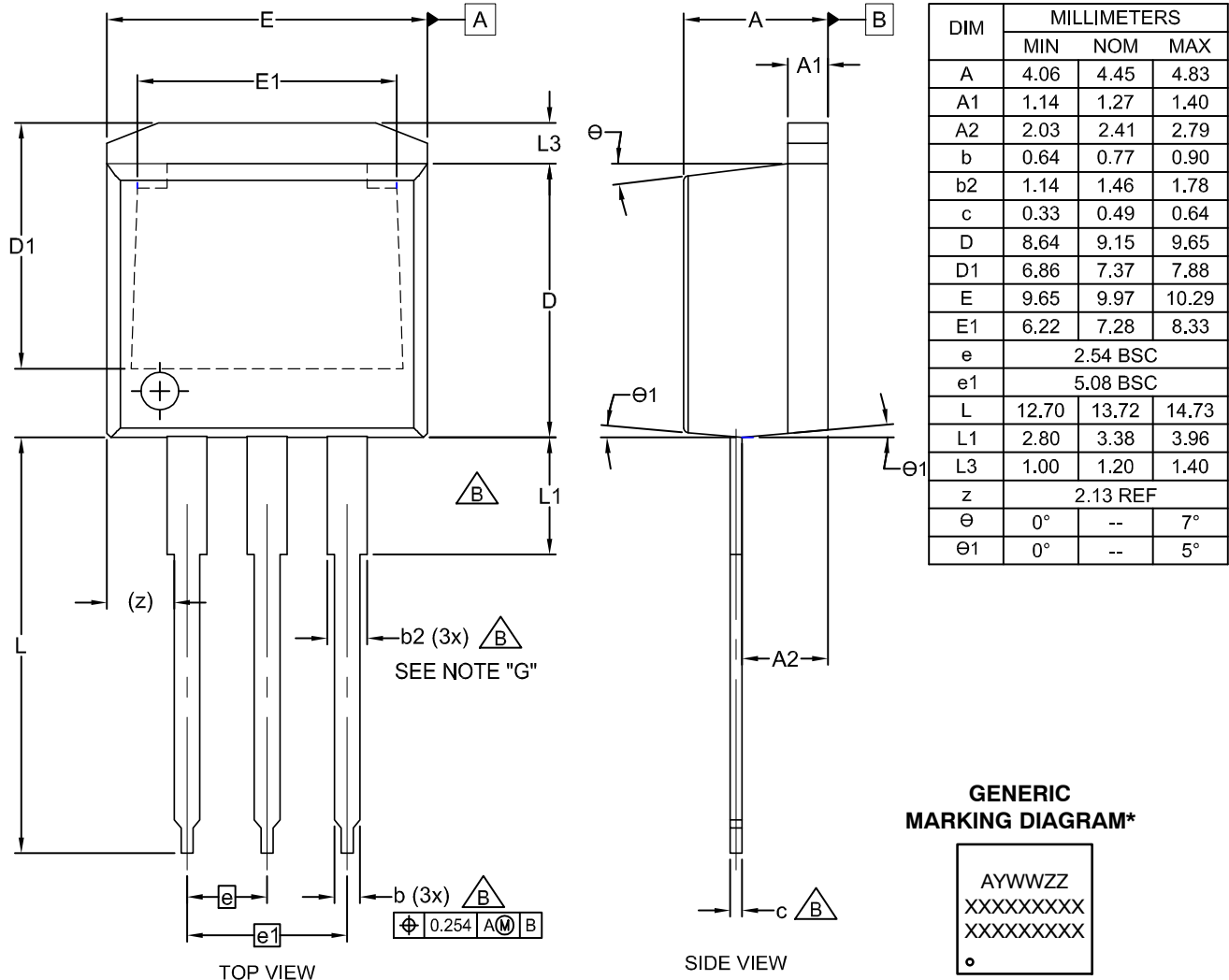
# FDI150N10



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


**I2PAK (TO-262 3 LD)**  
CASE 418AV  
ISSUE A

DATE 30 AUG 2022



## NOTES:

- A. EXCEPT WHERE NOTED CONFORMS TO T262 JEDEC VARIATION AA.  
B. DOES NOT COMPLY JEDEC STD. VALUE.  
C. ALL DIMENSIONS ARE IN MILLIMETERS.  
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.  
E. DIMENSION AND TOLERANCE AS PER ANSI Y14.5-1994.  
F. LOCATION OF PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF PACKAGE)  
G. MAXIMUM WIDTH FOR F102 DEVICE = 1.35 MAX.

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.

|                         |                            |                                                                                                                                                                                     |
|-------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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