

# MOSFET – N-Channel POWERTRENCH®

**75 V, 100 A, 3.7 mΩ**

## FDMS037N08B

### Description

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

### Features

- $R_{DS(on)} = 3.01 \text{ m}\Omega$  (Typ.) @  $V_{GS} = 10 \text{ V}$ ,  $I_D = 50 \text{ A}$
- Low FOM  $R_{DS(on)} * Q_G$
- Low Reverse Recovery Charge,  $Q_{rr} = 80 \text{ nC}$
- Soft Reverse Recovery Body Diode
- Enables Highly Efficiency in Synchronous Rectification
- Fast Switching Speed
- 100% UIL Tested
- These Device is Pb-Free and RoHS Compliant

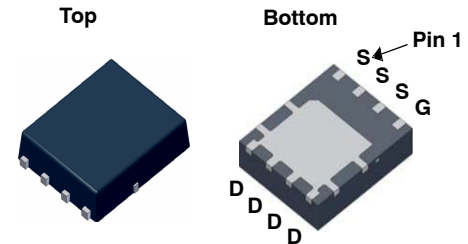
### Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection circuit
- DC Motor Drives and Uninterruptible Power Supplies

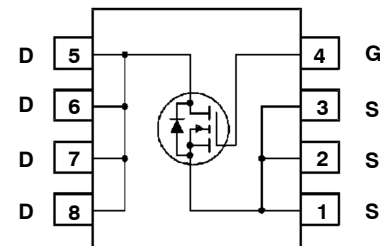
### MOSFET MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Symbol         | Parameter                                                  | Value           | Unit             |
|----------------|------------------------------------------------------------|-----------------|------------------|
| $V_{DS}$       | Drain to Source Voltage                                    | 75              | V                |
| $V_{GS}$       | Gate to Source Voltage                                     | $\pm 20$        | V                |
| $I_D$          | Drain Current                                              |                 | A                |
|                | – Continuous ( $T_C = 25^\circ\text{C}$ )                  | 100             |                  |
|                | – Continuous ( $T_C = 25^\circ\text{C}$ , Silicon Limited) | 128             |                  |
|                | – Continuous ( $T_A = 25^\circ\text{C}$ ) (Note 9a)        | 19.9            |                  |
| $I_{DM}$       | Drain Current                                              | 400             | A                |
|                | – Pulsed (Note 10)                                         |                 |                  |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 11)                    | 180.6           | mJ               |
| $P_D$          | Power Dissipation ( $T_C = 25^\circ\text{C}$ )             | 104.2           | W                |
|                | Power Dissipation ( $T_A = 25^\circ\text{C}$ ) (Note 9a)   | 0.83            |                  |
| $T_J, T_{stg}$ | Operating and Storage Junction Temperature Range           | $-55$ to $+150$ | $^\circ\text{C}$ |

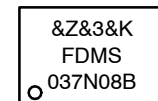
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



PQFN8 5X6, 1.27P  
(Power 56)  
CASE 483AE



### MARKING DIAGRAM



&Z = Assembly Plant Code  
 &3 = Numeric Date Code  
 &K = 2-Digit Lot Code  
 FDMS037N08B = Specific Device Code

### ORDERING INFORMATION

| Device      | Package             | Shipping†             |
|-------------|---------------------|-----------------------|
| FDMS037N08B | PQFN-8<br>(Pb-Free) | 3000 /<br>Tape & Reel |

†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](#).

## THERMAL CHARACTERISTICS

| Symbol          | Parameter                                              | Value | Unit |
|-----------------|--------------------------------------------------------|-------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max              | 1.2   | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, Max (Note 9a) | 50    |      |

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

| Symbol                               | Parameter                                 | Test Conditions                                             | Min | Typ | Max       | Unit          |
|--------------------------------------|-------------------------------------------|-------------------------------------------------------------|-----|-----|-----------|---------------|
| <b>Off Characteristics</b>           |                                           |                                                             |     |     |           |               |
| $BV_{DSS}$                           | Drain to Source Breakdown Voltage         | $I_D = 250\ \mu\text{A}$ , $V_{GS} = 0\ \text{V}$           | 75  | –   | –         | V             |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$ | –   | 39  | –         | mV/°C         |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = 60\ \text{V}$ , $V_{GS} = 0\ \text{V}$            | –   | –   | 1         | $\mu\text{A}$ |
| $I_{GSS}$                            | 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–Source On–Resistance | $V_{GS} = 10\ \text{V}$ , $I_D = 50\ \text{A}$ | –   | 3.01 | 3.7 | m $\Omega$ |
| $g_{FS}$     | Forward Transconductance          | $V_{DS} = 10\ \text{V}$ , $I_D = 50\ \text{A}$ | –   | 108  | –   | S          |

## Dynamic Characteristics

|               |                                   |                                                                                                |   |      |      |          |
|---------------|-----------------------------------|------------------------------------------------------------------------------------------------|---|------|------|----------|
| $C_{iss}$     | Input Capacitance                 | $V_{DS} = 37.5\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$                       | – | 4550 | 5915 | pF       |
| $C_{oss}$     | Output Capacitance                |                                                                                                | – | 1060 | 1380 | pF       |
| $C_{rss}$     | Reverse Transfer Capacitance      |                                                                                                | – | 30.2 | 45   | pF       |
| $C_{oss(er)}$ | Energy Related Output Capacitance | $V_{DS} = 37.5\ \text{V}$ , $V_{GS} = 0\ \text{V}$                                             | – | 1702 | –    | pF       |
| $Q_{g(tot)}$  | Total Gate Charge at 10 V         | $V_{DS} = 37.5\ \text{V}$ , $I_D = 50\ \text{A}$<br>$V_{GS} = 0\ \text{V}$ , to 10 V (Note 12) | – | 76.8 | 100  | nC       |
| $Q_{gs}$      | Gate to Source Gate Charge        |                                                                                                | – | 27.5 | –    | nC       |
| $Q_{gd}$      | Gate to Drain “Miller” Charge     |                                                                                                | – | 17.4 | –    | nC       |
| $V_{plateau}$ | Gate to Drain Plateau Voltage     |                                                                                                | – | 5.1  | –    | V        |
| $Q_{sync}$    | Total Gate Charge Sync            | $V_{DS} = 0\ \text{V}$ , $I_D = 50\ \text{A}$                                                  | – | 66.3 | –    | nC       |
| $Q_{oss}$     | Output Charge                     | $V_{DS} = 37.5\ \text{V}$ , $V_{GS} = 0\ \text{V}$                                             | – | 74.6 | –    | nC       |
| ESR           | Equivalent Series Resistance      | $f = 1\ \text{MHz}$                                                                            | – | 1.28 | –    | $\Omega$ |

## Switching Characteristics

|              |                     |                                                                                                               |   |      |     |    |
|--------------|---------------------|---------------------------------------------------------------------------------------------------------------|---|------|-----|----|
| $t_{d(on)}$  | Turn–On Delay Time  | $V_{DD} = 37.5\ \text{V}$ , $I_D = 50\ \text{A}$ ,<br>$V_{GS} = 10\ \text{V}$ , $R_G = 4.7\ \Omega$ (Note 12) | – | 34.9 | 80  | ns |
| $t_r$        | Turn–On Rise Time   |                                                                                                               | – | 20.1 | 50  | ns |
| $t_{d(off)}$ | Turn–Off Delay Time |                                                                                                               | – | 55.3 | 120 | ns |
| $t_f$        | Turn–Off Fall Time  |                                                                                                               | – | 19.4 | 49  | ns |

## Drain–Source Diode Characteristics and Maximum Ratings

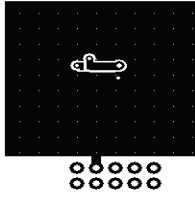
|                 |                                                          |                                                                                 |   |      |     |    |
|-----------------|----------------------------------------------------------|---------------------------------------------------------------------------------|---|------|-----|----|
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current |                                                                                 | – | –    | 100 | A  |
| I <sub>SM</sub> | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                 | – | –    | 400 | A  |
| V <sub>SD</sub> | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 50 A                                   | – | –    | 1.3 | V  |
| t <sub>rr</sub> | Reverse Recovery Time                                    | V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 50 A<br>dI <sub>F</sub> /dt = 100 A/μs | – | 66.8 | –   | ns |
| Q <sub>rr</sub> | Reverse Recovery Charge                                  |                                                                                 | – | 84   | –   | 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.

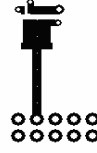
## FDMS037N08B

### NOTES:

1.  $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> oz copper pad on a 1.5 x 1.5 in. board of FR-4 material.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a).50 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



b).125 °C/W when mounted on a minimum pad of 2 oz copper.

2. Repetitive rating: pulse-width limited by maximum junction temperature.
3.  $L = 0.3$  mH,  $I_{AS} = 34.7$  A, starting  $T_J = 25^\circ\text{C}$ .
4. Essentially independent of operating temperature typical characteristics.

## TYPICAL CHARACTERISTICS

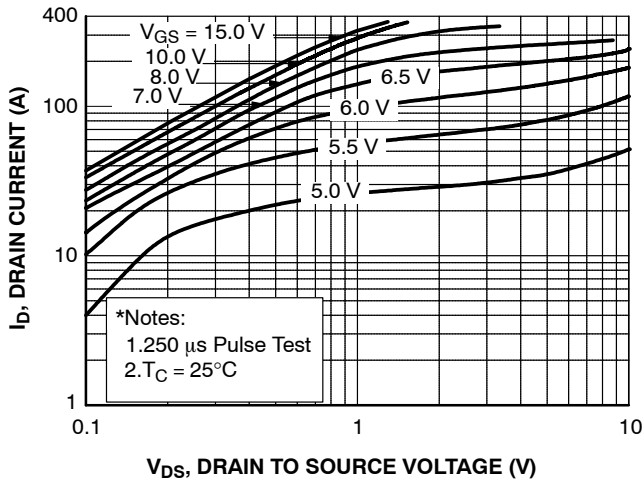


Figure 1. On-Region Characteristics

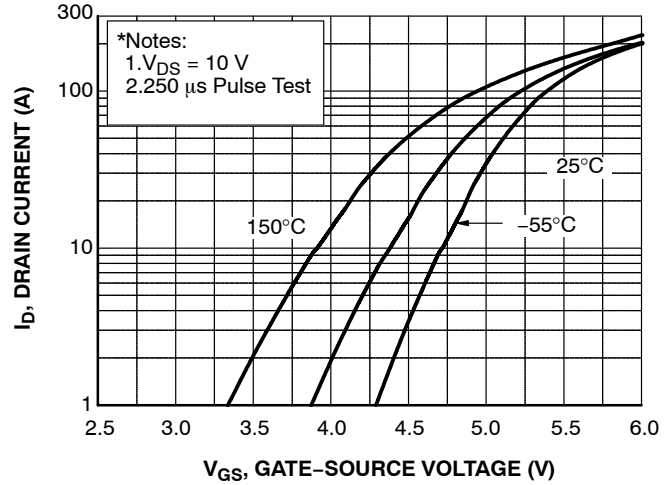


Figure 2. Transfer Characteristics

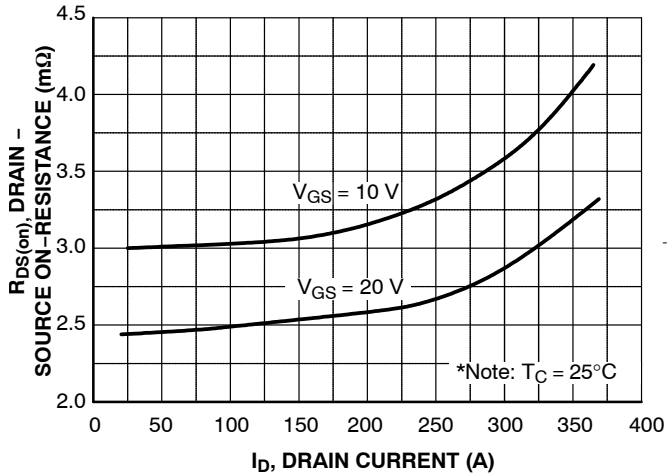


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

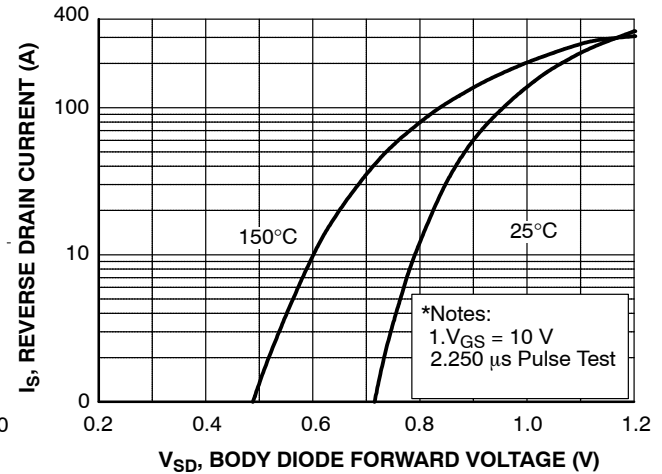


Figure 4. Body Diode Forward Voltage Variation vs Source Current and Temperature

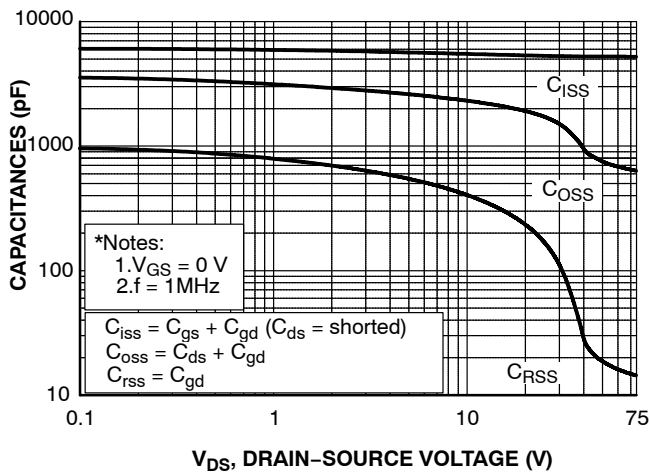


Figure 5. Capacitance Characteristics

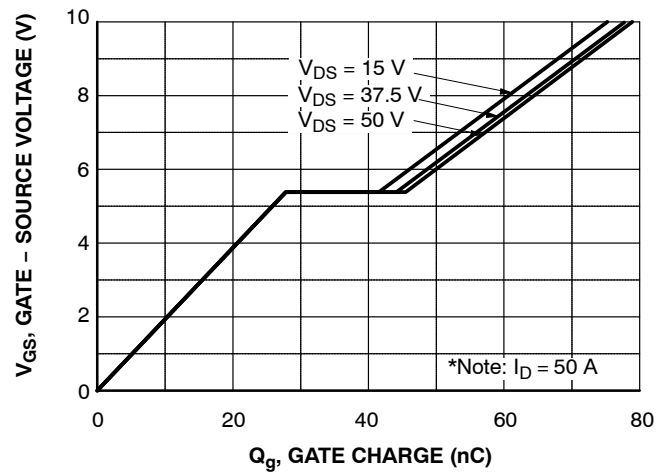
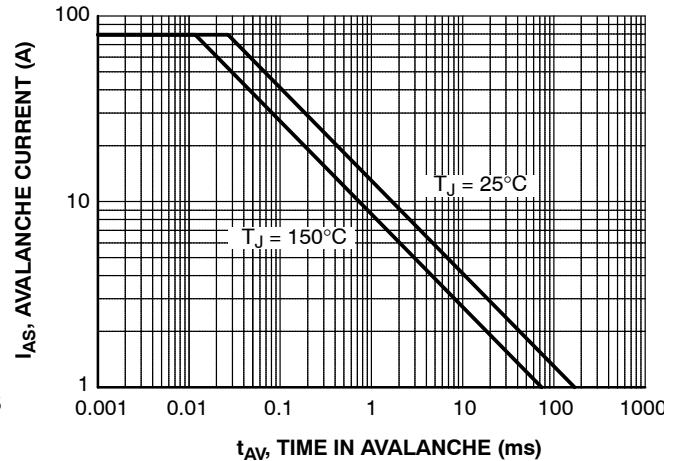
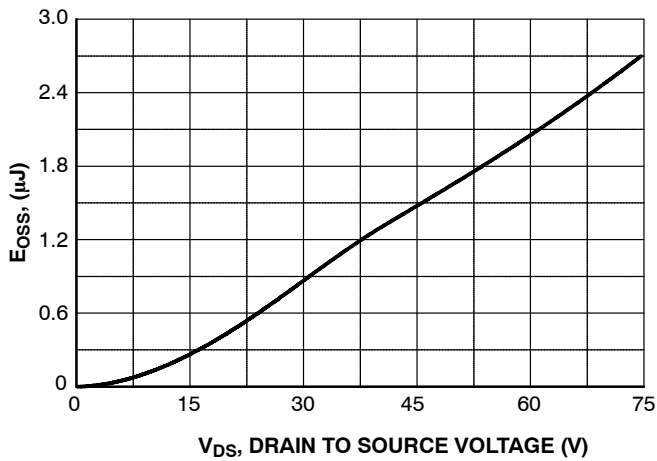
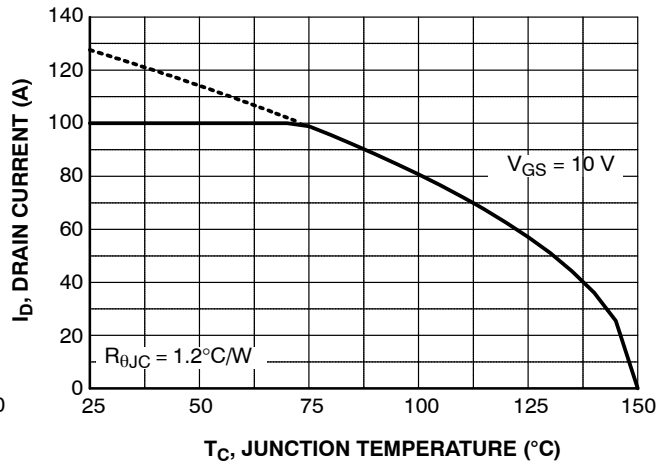
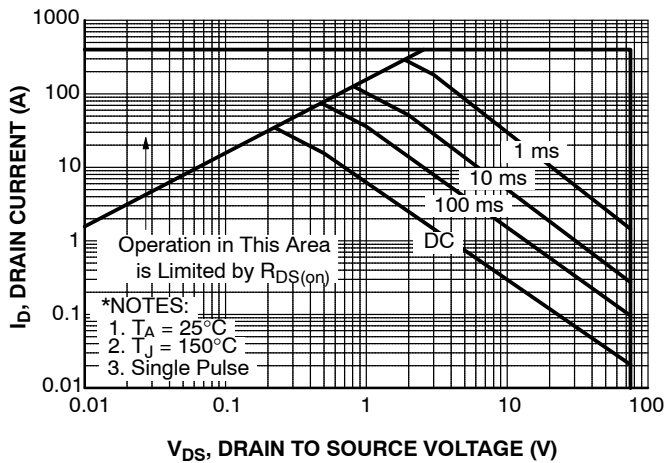
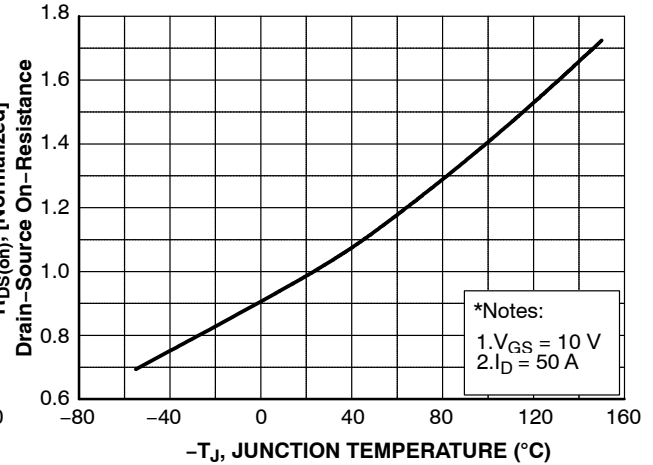
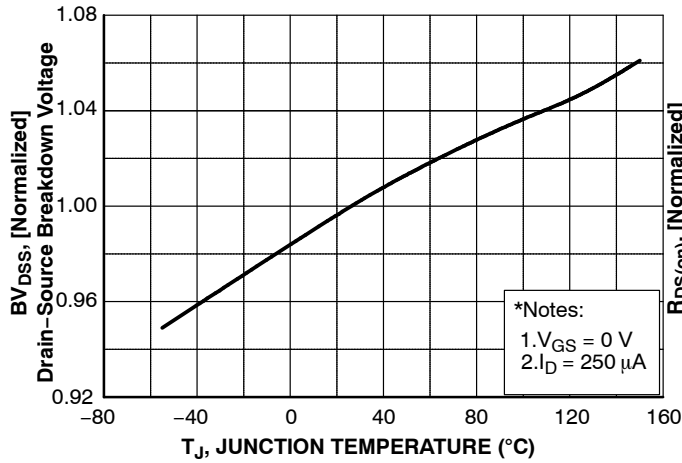


Figure 6. Gate Charge Characteristics

## TYPICAL CHARACTERISTICS (continued)



## TYPICAL CHARACTERISTICS (continued)

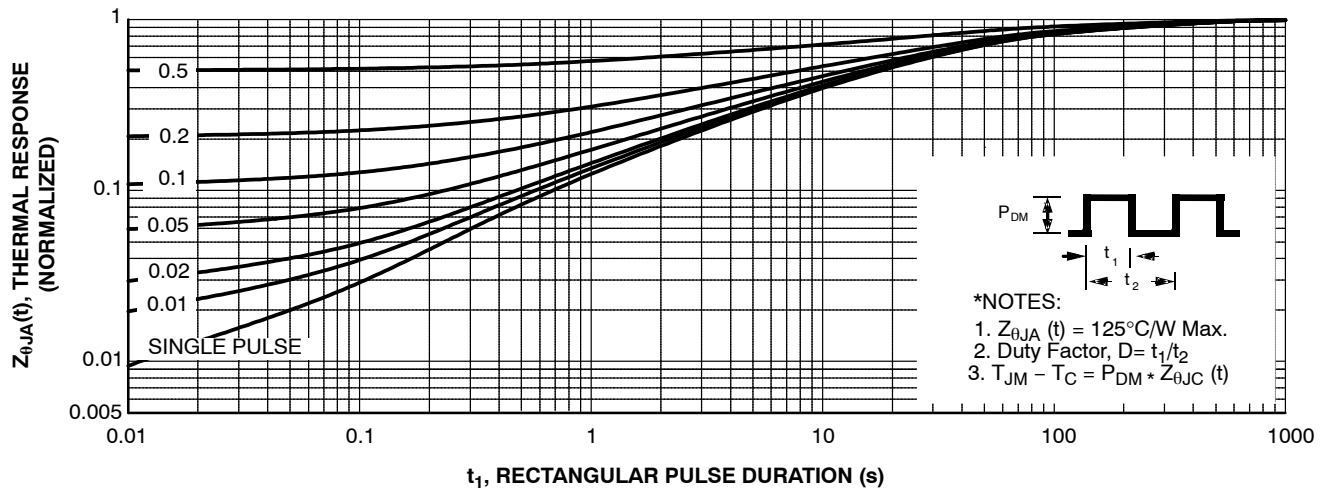


Figure 13. Transient Thermal Response Curve

TYPICAL CHARACTERISTICS (continued)

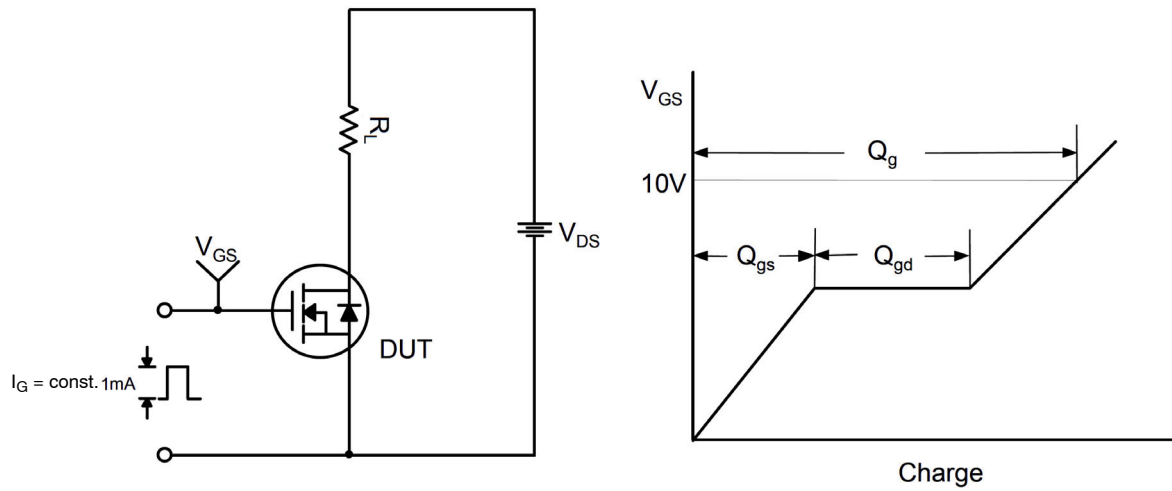


Figure 14. Gate Charge Test Circuit & Waveform

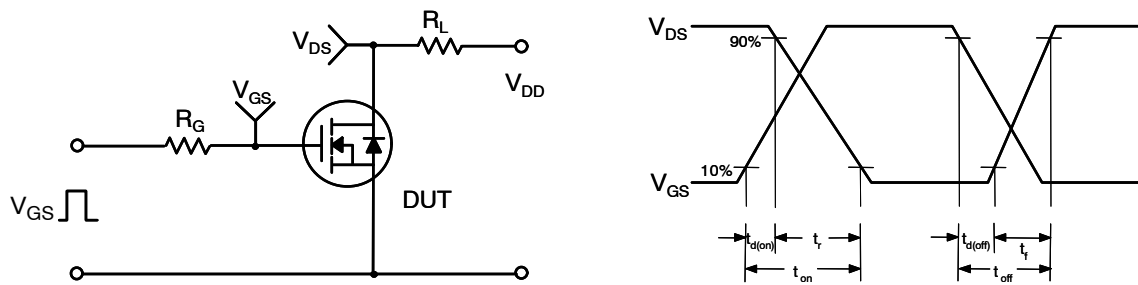


Figure 15. Resistive Switching Test Circuit & Waveforms

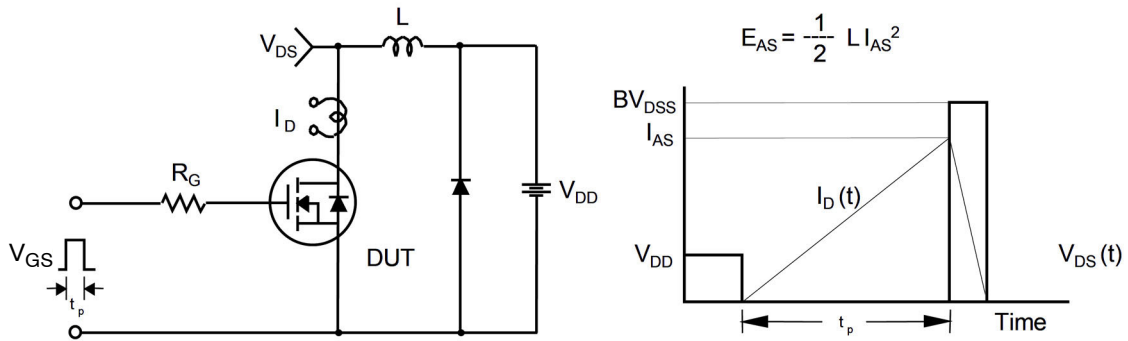


Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms

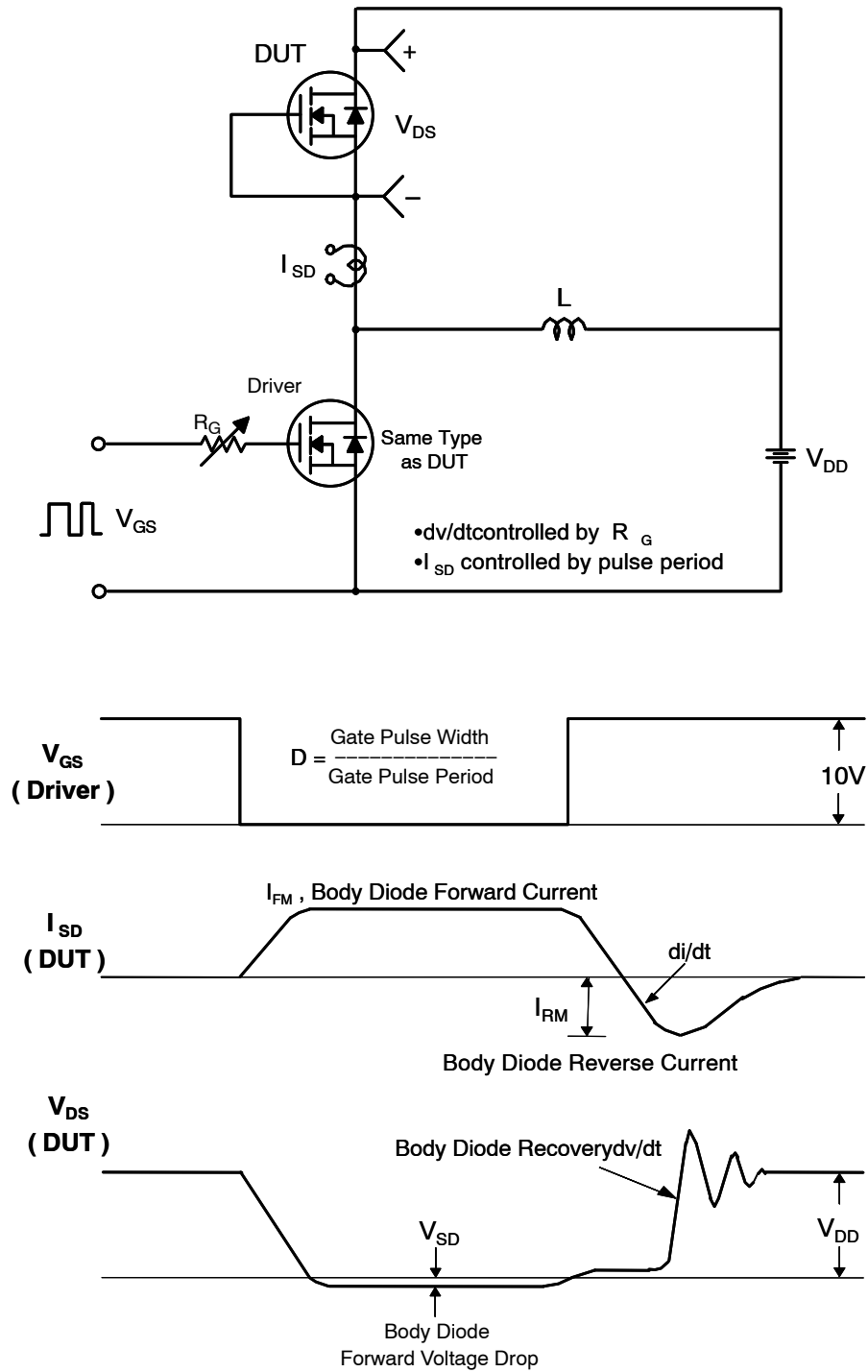


Figure 17. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms



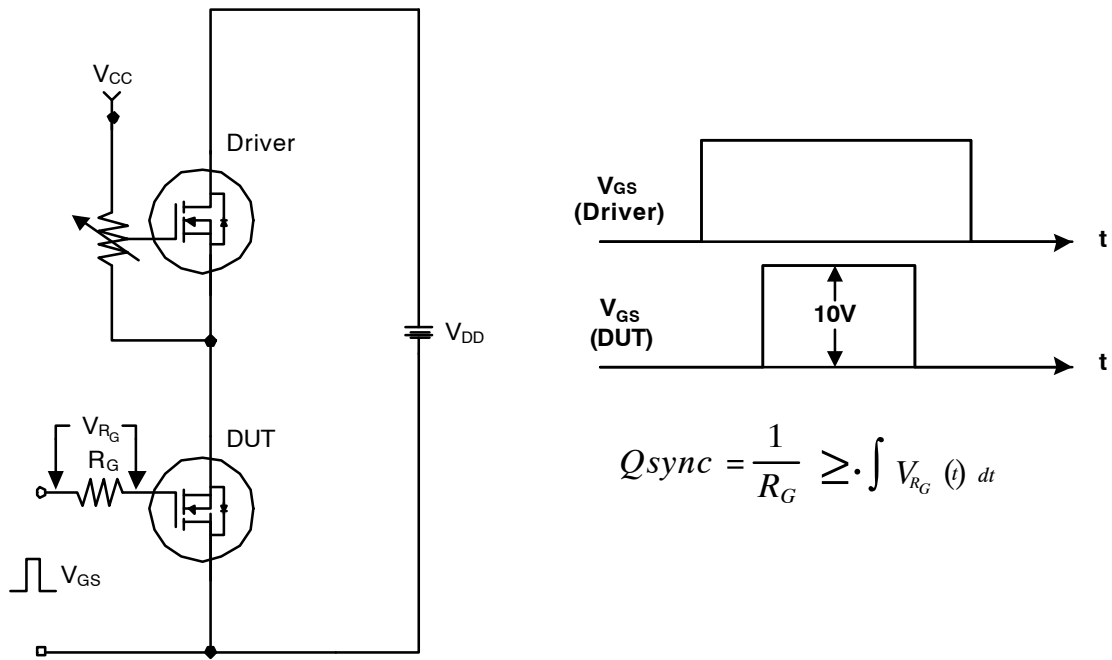
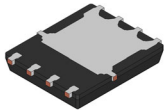
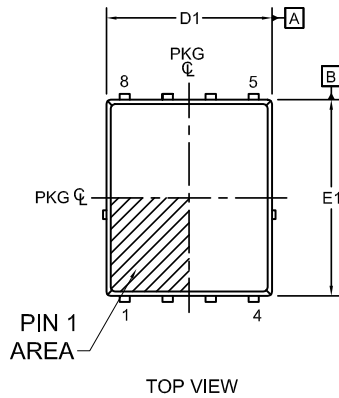


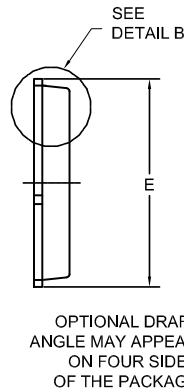
Figure 18. Total Gate Charge  $Q_{sync}$ . Test Circuit & Waveforms


**PQFN8 5X6, 1.27P**  
**CASE 483AE**  
**ISSUE C**

DATE 21 JAN 2022

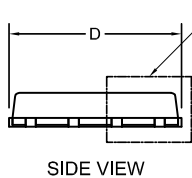


TOP VIEW

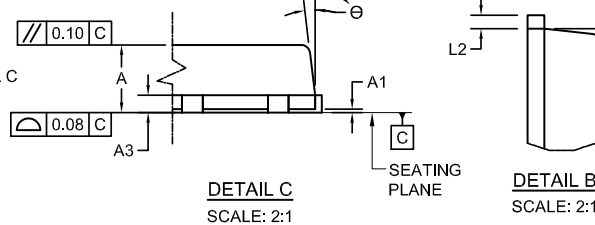
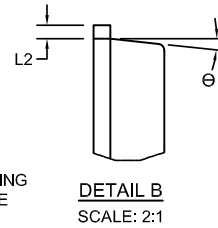
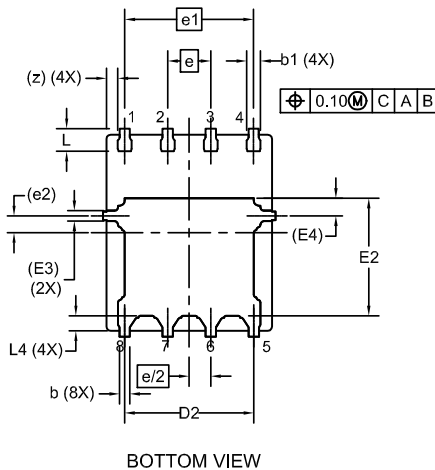

OPTIONAL DRAFT  
ANGLE MAY APPEAR  
ON FOUR SIDES  
OF THE PACKAGE

## NOTES:

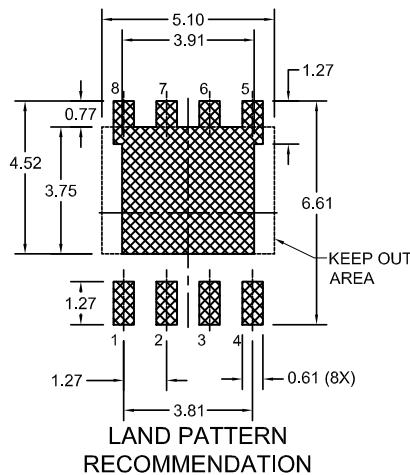
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
6. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.



SIDE VIEW


DETAIL C  
SCALE: 2:1

DETAIL B  
SCALE: 2:1


BOTTOM VIEW


LAND PATTERN  
RECOMMENDATION

\*FOR ADDITIONAL INFORMATION ON OUR  
PB-FREE STRATEGY AND SOLDERING  
DETAILS, PLEASE DOWNLOAD THE ON  
SEMICONDUCTOR SOLDERING AND  
MOUNTING TECHNIQUES REFERENCE  
MANUAL, SOLDERRM/D.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.90        | 1.00 | 1.10 |
| A1  | 0.00        | -    | 0.05 |
| b   | 0.21        | 0.31 | 0.41 |
| b1  | 0.31        | 0.41 | 0.51 |
| A3  | 0.15        | 0.25 | 0.35 |
| D   | 4.90        | 5.00 | 5.20 |
| D1  | 4.80        | 4.90 | 5.00 |
| D2  | 3.61        | 3.82 | 3.96 |
| E   | 5.90        | 6.15 | 6.25 |
| E1  | 5.70        | 5.80 | 5.90 |
| E2  | 3.38        | 3.48 | 3.78 |
| E3  | 0.30 REF    |      |      |
| E4  | 0.52 REF    |      |      |
| e   | 1.27 BSC    |      |      |
| e/2 | 0.635 BSC   |      |      |
| e1  | 3.81 BSC    |      |      |
| e2  | 0.50 REF    |      |      |
| L   | 0.51        | 0.66 | 0.76 |
| L2  | 0.05        | 0.18 | 0.30 |
| L4  | 0.34        | 0.44 | 0.54 |
| z   | 0.34 REF    |      |      |
| Θ   | 0°          | -    | 12°  |

DOCUMENT NUMBER: 98AON13655G

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DESCRIPTION: PQFN8 5X6, 1.27P

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