

# FDMD8630

## MOSFET – N-Channel, POWERTRENCH<sup>®</sup>, Dual

**30 V, 167 A, 1.0 mΩ**

### General Description

This package integrates two N-Channel devices connected internally in common-source configuration. This enables very low package parasitics and optimized thermal path to the common source pad on the bottom. Provides a very small footprint (5 x 6 mm) for higher power density.

### Features

- Common Source Configuration to Eliminate PCB Routing
- Large Source Pad on Bottom of Package for Enhanced Thermals
- Max  $r_{DS(on)}$  = 1.0 mΩ at  $V_{GS}$  = 10 V,  $I_D$  = 38 A
- Max  $r_{DS(on)}$  = 1.3 mΩ at  $V_{GS}$  = 4.5 V,  $I_D$  = 33 A
- Ideal for Flexible Layout in Secondary Side Synchronous Rectification
- 100% UIL Tested
- This Device is Pb-Free and is RoHS Compliant

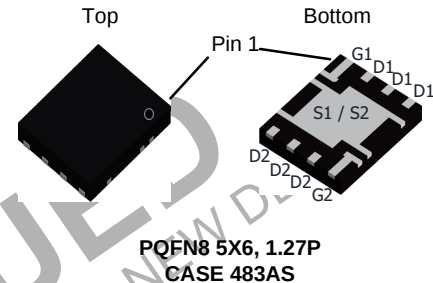
### Applications

- Isolated DC-DC Synchronous Rectifiers
- Common Ground Load Switches



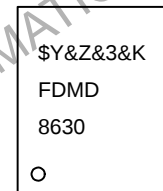
**ON Semiconductor<sup>®</sup>**

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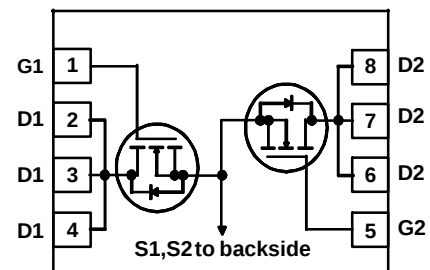
PQFN8 5X6, 1.27P  
CASE 483AS

### MARKING DIAGRAM



&Y = ON Semiconductor Logo  
&Z = Assembly Plant Code  
&3 = Numeric Date Code  
&K = Lot Code  
FDMD8630 = Specific Device Code

### PIN CONFIGURATION



### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# FDMD8630

## MOSFET MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ Unless Otherwise Noted

| Symbol         | Parameter                                                                 | Ratings         | Units            |
|----------------|---------------------------------------------------------------------------|-----------------|------------------|
| $V_{DS}$       | Drain to Source Voltage                                                   | 30              | V                |
| $V_{GS}$       | Gate to Source Voltage                                                    | $\pm 20$        | V                |
| $I_D$          | Drain Current<br>–Continuous – $T_C = 25^\circ\text{C}$ (Note 5)          | 167             | A                |
|                | –Continuous – $T_C = 100^\circ\text{C}$ (Note 5)                          | 106             |                  |
|                | –Continuous – $T_A = 25^\circ\text{C}$ (Note 1a)                          | 38              |                  |
|                | –Pulsed – (Note 4)                                                        | 1178            |                  |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 3)                                    | 726             | mJ               |
| $P_D$          | Power Dissipation for Single Operation $T_C = 25^\circ\text{C}$           | 43              | W                |
|                | Power Dissipation for Single Operation $T_A = 25^\circ\text{C}$ (Note 1a) | 2.3             |                  |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                          | $-55$ to $+150$ | $^\circ\text{C}$ |

## THERMAL CHARACTERISTICS

| Symbol          | Parameter                                         | Ratings | Unit               |
|-----------------|---------------------------------------------------|---------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case              | 2.9     | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 55      |                    |

## PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device   | Package     | Reel Size | Tape Width | Quantity   |
|----------------|----------|-------------|-----------|------------|------------|
| FDMD8630       | FDMD8630 | Power 5 x 6 | 13"       | 12 mm      | 3000 Units |

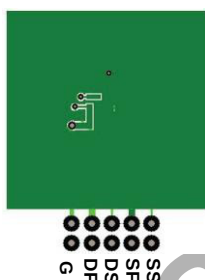
## ELECTRICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$ Unless Otherwise Noted

| Symbol                                 | Parameter                                                | Test Conditions                                                        | Min | Typ  | Max  | Units |
|----------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------|-----|------|------|-------|
| OFF CHARACTERISTICS                    |                                                          |                                                                        |     |      |      |       |
| BV <sub>DSS</sub>                      | Drain to Source Breakdown Voltage                        | I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V                         | 30  |      |      | V     |
| ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>   | Breakdown Voltage Temperature Coefficient                | I <sub>D</sub> = 250 μA, referenced to 25°C                            |     | 15   |      | mV/°C |
| I <sub>DSS</sub>                       | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V                          |     |      | 1    | μA    |
| I <sub>GSS</sub>                       | Gate to Source Leakage Current, Forward                  | V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V                          |     |      | 100  | nA    |
| ON CHARACTERISTICS                     |                                                          |                                                                        |     |      |      |       |
| V <sub>GS(th)</sub>                    | Gate to Source Threshold Voltage                         | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA            | 1.0 | 1.6  | 3.0  | V     |
| ΔV <sub>GS(th)</sub> / ΔT <sub>J</sub> | Gate to Source Threshold Voltage Temperature Coefficient | I <sub>D</sub> = 250 μA, referenced to 25°C                            |     | −6   |      | mV/°C |
| r <sub>DS(on)</sub>                    | Static Drain to Source On Resistance                     | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 38 A                          |     | 0.6  | 1.0  | mΩ    |
|                                        |                                                          | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 33 A                         |     | 0.8  | 1.3  |       |
|                                        |                                                          | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 33 A, T <sub>J</sub> = 125°C |     | 0.9  | 1.5  |       |
| g <sub>FS</sub>                        | Forward Transconductance                                 | V <sub>DD</sub> = 5 V, I <sub>D</sub> = 38 A                           |     | 281  |      | S     |
| DYNAMIC CHARACTERISTICS                |                                                          |                                                                        |     |      |      |       |
| C <sub>iss</sub>                       | Input Capacitance                                        | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz               |     | 7090 | 9930 | pF    |
| C <sub>oss</sub>                       | Output Capacitance                                       |                                                                        |     | 2025 | 2835 | pF    |
| C <sub>rss</sub>                       | Reverse Transfer Capacitance                             |                                                                        |     | 212  | 300  | pF    |
| R <sub>g</sub>                         | Gate Resistance                                          |                                                                        | 0.1 | 1.9  | 3.8  | Ω     |
| SWITCHING CHARACTERISTICS              |                                                          |                                                                        |     |      |      |       |

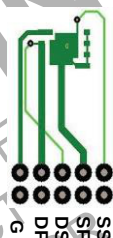
ELECTRICAL CHARACTERISTICS  $T_J = 25^\circ\text{C}$  Unless Otherwise Noted (continued)

| Symbol                             | Parameter                             | Test Conditions                                                                                 |                                                 | Min | Typ | Max | Units |
|------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------|-----|-----|-----|-------|
| SWITCHING CHARACTERISTICS          |                                       |                                                                                                 |                                                 |     |     |     |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                    | V <sub>DD</sub> = 15 V, I <sub>D</sub> = 38 A<br>V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω |                                                 |     | 14  | 26  | ns    |
| t <sub>r</sub>                     | Rise Time                             |                                                                                                 |                                                 |     | 15  | 27  | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                   |                                                                                                 |                                                 |     | 66  | 105 | ns    |
| t <sub>f</sub>                     | Fall Time                             |                                                                                                 |                                                 |     | 24  | 39  | ns    |
| Q <sub>g(TOT)</sub>                | Total Gate Charge                     | V <sub>GS</sub> = 0 V to 10 V                                                                   | V <sub>DD</sub> = 15 V<br>I <sub>D</sub> = 38 A |     | 97  | 142 | nC    |
| Q <sub>g(TOT)</sub>                | Total Gate Charge                     | V <sub>GS</sub> = 0 V to 4.5 V                                                                  |                                                 |     | 46  | 74  | nC    |
| Q <sub>gs</sub>                    | Gate to Source Gate Charge            |                                                                                                 |                                                 |     | 17  |     | nC    |
| Q <sub>gd</sub>                    | Gate to Drain “Miller” Charge         |                                                                                                 |                                                 |     | 12  |     | nC    |
| DRAIN–SOURCE DIODE CHARACTERISTICS |                                       |                                                                                                 |                                                 |     |     |     |       |
| V <sub>SD</sub>                    | Source to Drain Diode Forward Voltage | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 38 A (Note 2)                                           |                                                 |     | 0.8 | 1.3 | V     |
| V <sub>SD</sub>                    | Source to Drain Diode Forward Voltage | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 2 A (Note 2)                                            |                                                 |     | 0.7 | 1.2 | V     |
| t <sub>rr</sub>                    | Reverse Recovery Time                 | I <sub>F</sub> = 38 A, di/dt = 100 A/μs                                                         |                                                 |     | 64  | 103 | ns    |
| Q <sub>rr</sub>                    | Reverse Recovery Charge               |                                                                                                 |                                                 |     | 56  | 90  | nC    |

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



a.  $55^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b.  $125^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0%.  
 3.  $E_{AS}$  of 726 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 3\text{ mH}$ ,  $I_{AS} = 22\text{ A}$ ,  $V_{DD} = 30\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% tested at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 70\text{ A}$ .  
 4. Pulsed  $I_d$  please refer to Fig 11 SOA graph for more details.  
 5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

## TYPICAL CHARACTERISTICS

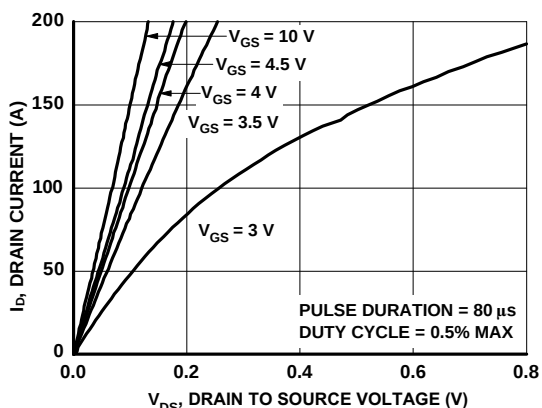
 $T_J = 25^\circ\text{C}$  Unless Otherwise Noted

Figure 1. On-Region Characteristics

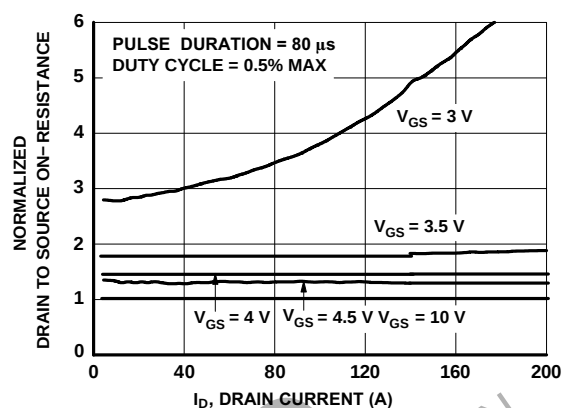


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

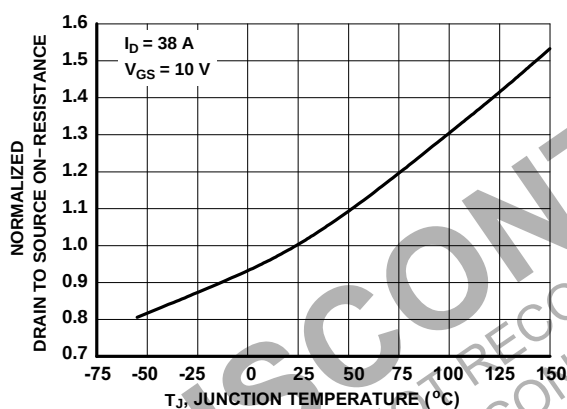


Figure 3. Normalized On Resistance vs Junction Temperature

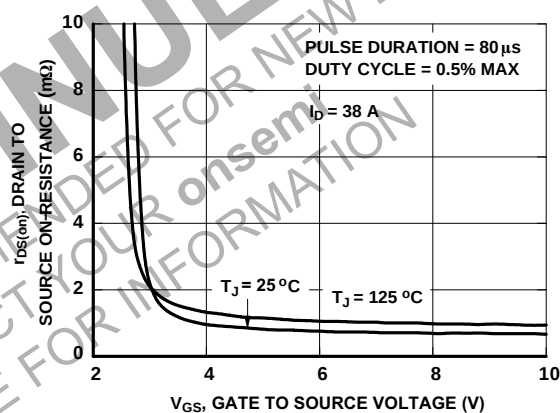


Figure 4. On-Resistance vs Gate to Source Voltage

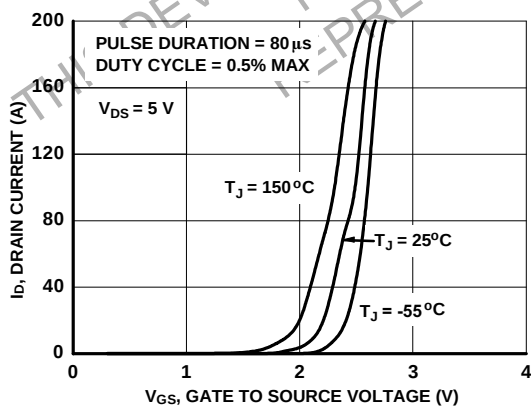


Figure 5. Transfer Characteristics

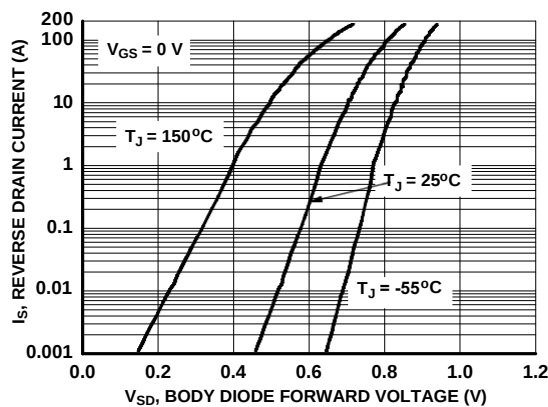


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

# TYPICAL CHARACTERISTICS

$T_J = 25^\circ\text{C}$  Unless Otherwise Noted (continued)

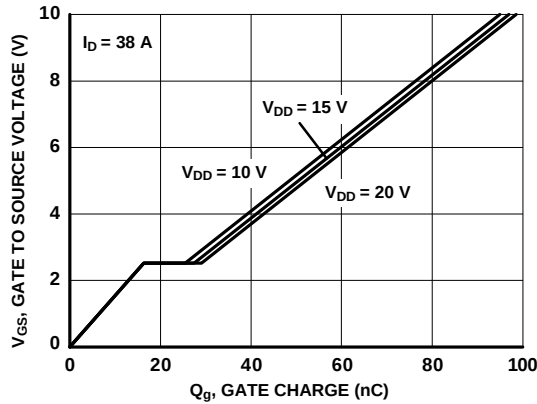


Figure 7. Gate Charge Characteristics

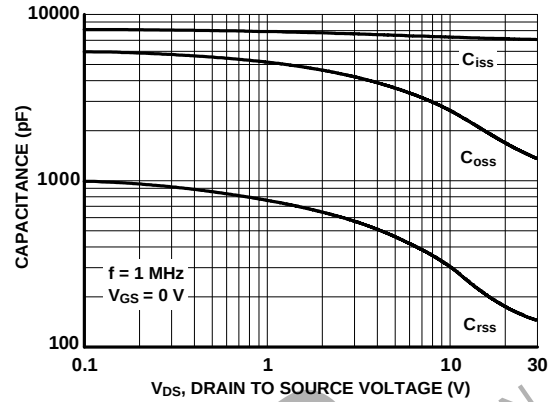


Figure 8. Capacitance vs Drain to Source Voltage

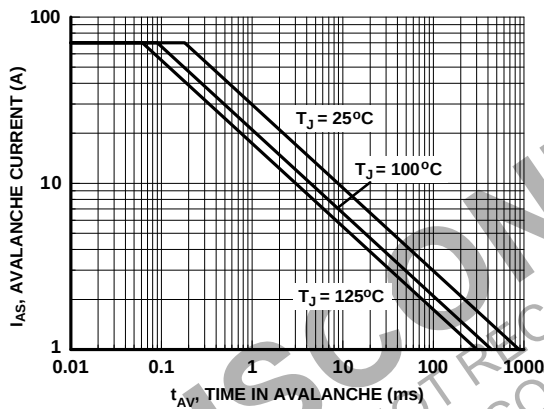


Figure 9. Unclamped Inductive Switching Capability

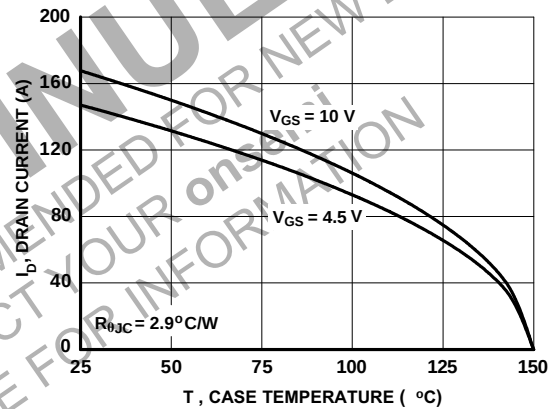


Figure 10. Maximum Continuous Drain Current vs Case Temperature

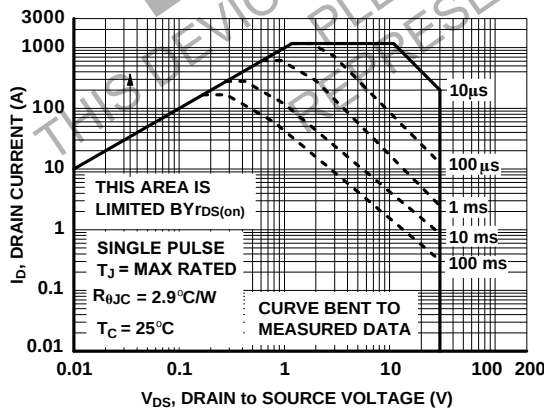


Figure 11. Forward Bias Safe Operating Area

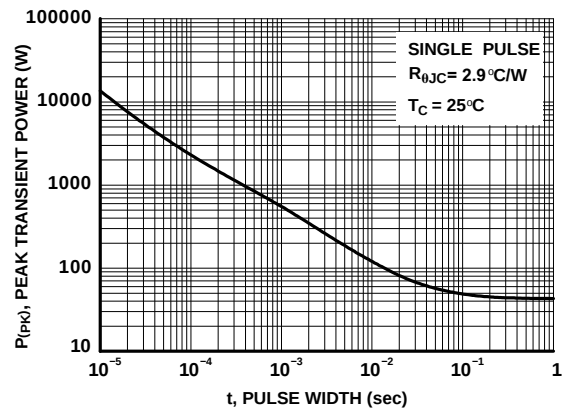


Figure 12. Single Pulse Maximum Power Dissipation

## TYPICAL CHARACTERISTICS

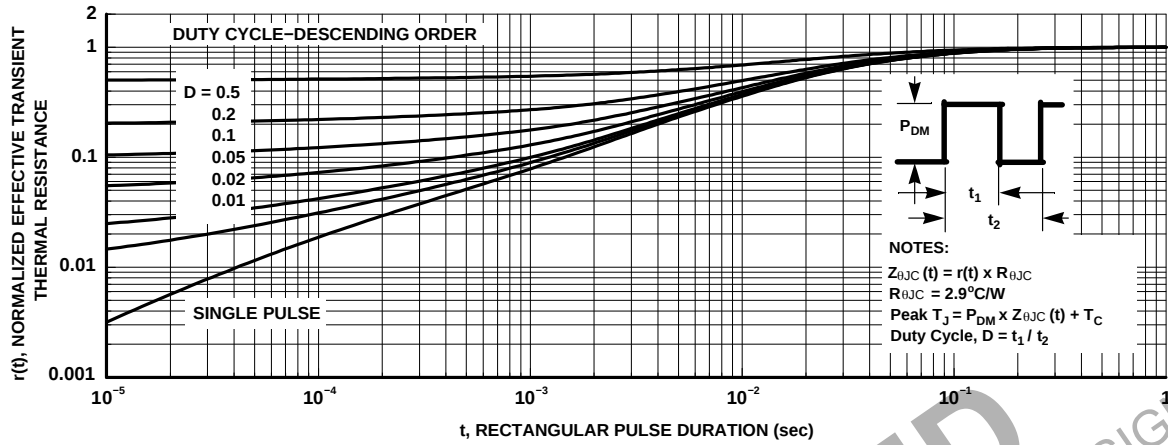
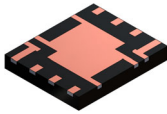
 $T_J = 25^\circ\text{C}$  Unless Otherwise Noted (continued)

Figure 13. Junction-to-Ambient Transient Thermal Response Curve

**DISCONTINUED**

THIS DEVICE IS NOT RECOMMENDED FOR NEW DESIGN  
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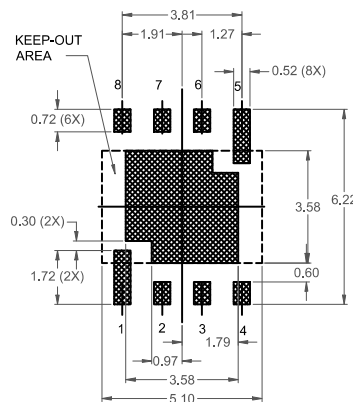
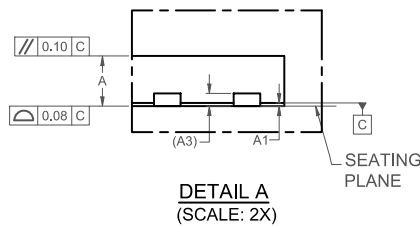
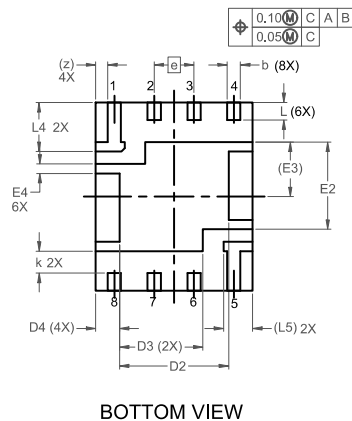
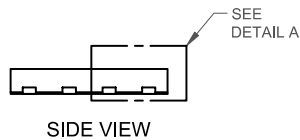
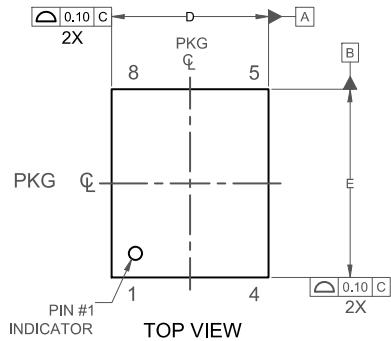
**PQFN8 5X6, 1.27P**  
**CASE 483AS**  
**ISSUE A**

DATE 17 MAY 2021

NOTES:

- A) PACKAGE REFERENCE :  
 TO JEDEC REGISTRATION, MO-240B, VARIATION AA.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.  
 MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.  
 D) DIMENSIONING AND TOLERANCING PER ASME  
 Y14.5M-2009  
 E) IT IS RECOMMENDED TO HAVE NO  
 TRACES OR VIAS WITHIN THE KEEP-OUT AREA

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.70        | 0.75 | 0.80 |
| A1  | 0.00        | -    | 0.05 |
| b   | 0.37        | 0.42 | 0.47 |
| A3  | 0.20 REF    |      |      |
| D   | 4.90        | 5.00 | 5.10 |
| D2  | 3.38        | 3.48 | 3.58 |
| D3  | 2.55        | 2.65 | 2.75 |
| D4  | 0.66        | 0.76 | 0.86 |
| E   | 5.90        | 6.00 | 6.10 |
| E2  | 2.68        | 2.78 | 2.88 |
| E3  | 1.74 REF    |      |      |
| E4  | 0.25        | 0.30 | 0.35 |
| e   | 1.27 BSC    |      |      |
| k   | 0.60        | 0.70 | 0.80 |
| L   | 0.46        | 0.56 | 0.66 |
| L4  | 1.46        | 1.56 | 1.66 |
| L5  | 0.82        | 0.92 | 1.02 |
| z   | 0.39 REF    |      |      |



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