

FDMC8462 Datasheet



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| | |
|------------------------------|--|
| DiGi Electronics Part Number | FDMC8462-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | FDMC8462 |
| Description | MOSFET N-CH 40V 14A/20A POWER33 |
| Detailed Description | N-Channel 40 V 14A (Ta), 20A (Tc) 2W (Ta), 41W (Tc) Surface Mount Power33 |



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DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

FDMC8462

Series:

PowerTrench®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

40 V

Drive Voltage (Max Rds On, Min Rds On):

4.5V, 10V

Vgs(th) (Max) @ Id:

3V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

Power33

Base Product Number:

FDMC84

Manufacturer:

onsemi

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

14A (Ta), 20A (Tc)

Rds On (Max) @ Id, Vgs:

5.8mOhm @ 13.5A, 10V

Gate Charge (Qg) (Max) @ Vgs:

43 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

2660 pF @ 20 V

Power Dissipation (Max):

2W (Ta), 41W (Tc)

Mounting Type:

Surface Mount

Package / Case:

8-PowerTDFN

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

MOSFET – N-Channel, POWERTRENCH®

40 V, 20 A, 5.8 mΩ

FDMC8462

General Description

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

Features

- Max $r_{DS(on)}$ = 5.8 mΩ at $V_{GS} = 10$ V, $I_D = 13.5$ A
Max $r_{DS(on)}$ = 8.0 mΩ at $V_{GS} = 4.5$ V, $I_D = 11.8$ A
- Low Profile – 1 mm Max in Power 33
- 100% UIL Tested
- Pb-Free, Halide Free and RoHS Compliant

Applications

- DC – DC Conversion

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

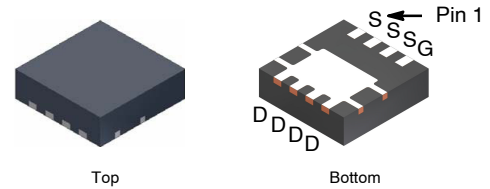
| Symbol | Parameter | Value | Unit |
|----------------|---|-------------|------------------|
| V_{DS} | Drain to Source Voltage | 40 | V |
| V_{GS} | Gate to Source Voltage | ±20 | V |
| I_D | Drain Current | | A |
| | – Continuous (Package Limited) $T_C = 25^\circ\text{C}$ | 20 | |
| | – Continuous (Silicon Limited) $T_C = 25^\circ\text{C}$ | 64 | |
| | – Continuous (Note 1a) $T_A = 25^\circ\text{C}$ | 14 | |
| | – Pulsed | 50 | |
| E_{AS} | Single Pulse Avalanche Energy (Note 3) | 216 | mJ |
| P_D | Power Dissipation $T_C = 25^\circ\text{C}$ | 41 | W |
| | Power Dissipation (Note 1a) $T_A = 25^\circ\text{C}$ | 2.0 | |
| 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.

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

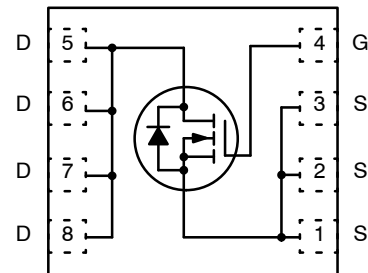
| Symbol | Parameter | Value | Unit |
|-----------------|---|-------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 3 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 53 | $^\circ\text{C}/\text{W}$ |

| V_{DS} | $r_{DS(on)}$ MAX | I_D MAX |
|----------|------------------|-----------|
| 40 V | 5.8 mΩ @ 10 V | 20 A |
| | 8.0 mΩ @ 4.5 V | |



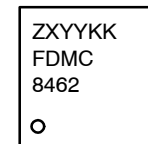
PQFN8 3.3 × 3.3, 0.65P
(Power 33)
CASE 483AK

ELECTRICAL CONNECTION



N-Channel MOSFET

MARKING DIAGRAM



- Z = Assembly Plant Code
- XYX = 3-Digit Date Code (Year and Week)
- KK = 2-Digits Lot Run Traceability Code
- FDMC8462 = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

FDMC8462

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

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------|-----------|-----------------|-----|-----|-----|------|
|--------|-----------|-----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|--------------------------------------|---|--|----|----|-----------|----------------------------|
| BV_{DSS} | Drain to Source Breakdown Voltage | $I_D = 250 \mu\text{A}$, $V_{GS} = 0 \text{ V}$ | 40 | - | - | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$, Referenced to 25°C | - | 31 | - | $\text{mV}/^\circ\text{C}$ |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{GS} = 0 \text{ V}$, $V_{DS} = 32 \text{ V}$ | - | - | 1 | μA |
| I_{GSS} | Gate to Source Leakage Current | $V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0 \text{ V}$ | - | - | ± 100 | nA |

ON CHARACTERISTICS

| | | | | | | |
|--|--|---|-----|-------------------|-------------------|----------------------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 250 \mu\text{A}$ | 1.0 | 2.0 | 3.0 | V |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$, Referenced to 25°C | - | -6.6 | - | $\text{mV}/^\circ\text{C}$ |
| $r_{DS(on)}$ | Static Drain to Source On-Resistance | $V_{GS} = 10 \text{ V}$, $I_D = 13.5 \text{ A}$ $V_{GS} = 4.5 \text{ V}$, $I_D = 11.8 \text{ A}$ $V_{GS} = 10 \text{ V}$, $I_D = 13.5 \text{ A}$, $T_J = 125^\circ\text{C}$ | - | 4.7 6.4 7.1 | 5.8 8.0 9.3 | $\text{m}\Omega$ |
| g_{FS} | Forward Transconductance | $V_{DD} = 5 \text{ V}$, $I_D = 13.5 \text{ A}$ | - | 60 | - | S |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|-----------|------------------------------|--|---|------|------|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 20 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ | - | 2000 | 2660 | pF |
| C_{oss} | Output Capacitance | | - | 545 | 725 | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 80 | 120 | pF |
| R_g | Gate Resistance | $f = 1 \text{ MHz}$ | - | 2.7 | - | Ω |

SWITCHING CHARACTERISTICS

| | | | | | | |
|--------------|-------------------------------|--|---|----|----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = 20 \text{ V}$, $I_D = 13.5 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = 6 \Omega$ | - | 12 | 21 | ns |
| t_r | Rise Time | | - | 4 | 10 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 27 | 43 | ns |
| t_f | Fall Time | | - | 3 | 10 | ns |
| Q_g | Total Gate Charge | $V_{GS} = 0 \text{ V}$ to 10 V , $V_{DD} = 20 \text{ V}$, $I_D = 13.5 \text{ A}$ | - | 30 | 43 | nC |
| | | $V_{GS} = 0 \text{ V}$ to 4.5 V , $V_{DD} = 20 \text{ V}$, $I_D = 13.5 \text{ A}$ | - | 15 | 21 | nC |
| Q_{gs} | Gate to Source Charge | $V_{DD} = 20 \text{ V}$, $I_D = 13.5 \text{ A}$ | - | 6 | - | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | $V_{DD} = 20 \text{ V}$, $I_D = 13.5 \text{ A}$ | - | 5 | - | nC |

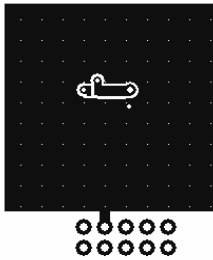
DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|----------|---------------------------------------|--|---|-----|-----|----|
| V_{SD} | Source to Drain Diode Forward Voltage | $V_{GS} = 0 \text{ V}$, $I_S = 13.5 \text{ A}$ (Note 2) | - | 0.8 | 1.3 | V |
| | | $V_{GS} = 0 \text{ V}$, $I_S = 1.7 \text{ A}$ (Note 2) | - | 0.7 | 1.2 | |
| t_{rr} | Reverse Recovery Time | $I_F = 13.5 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$ | - | 35 | 57 | ns |
| Q_{rr} | Reverse Recovery Charge | | - | 20 | 32 | 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:

- $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a $1.5 \times 1.5 \text{ in.}$ 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) $53^\circ\text{C}/\text{W}$ when mounted on a 1 in^2 pad of 2 oz copper



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

- Pulse Test: Pulse Width $< 300 \mu\text{s}$, Duty Cycle $< 2.0\%$.
- Starting $T_J = 25^\circ\text{C}$; N-ch: $L = 3 \text{ mH}$, $I_{AS} = 12 \text{ A}$, $V_{DD} = 40 \text{ V}$, $V_{GS} = 10 \text{ V}$.

FDMC8462

TYPICAL CHARACTERISTICS

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

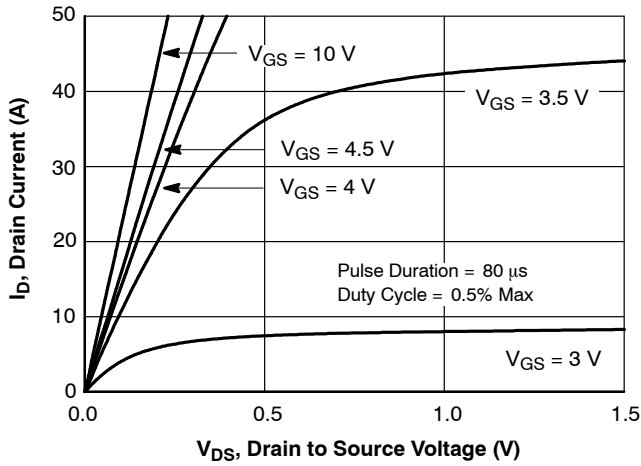


Figure 1. On-Region Characteristics

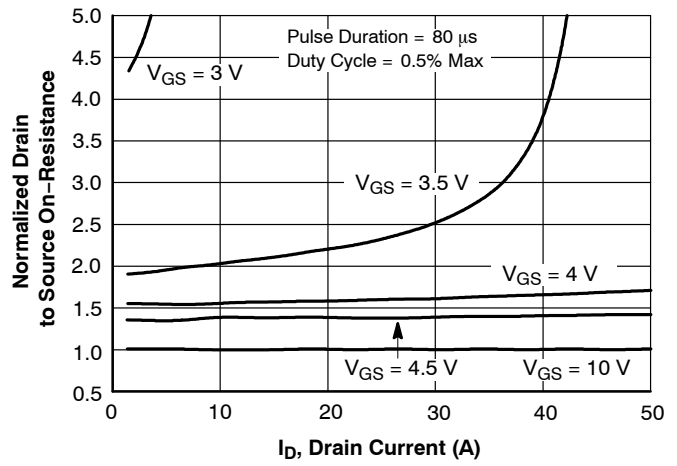


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

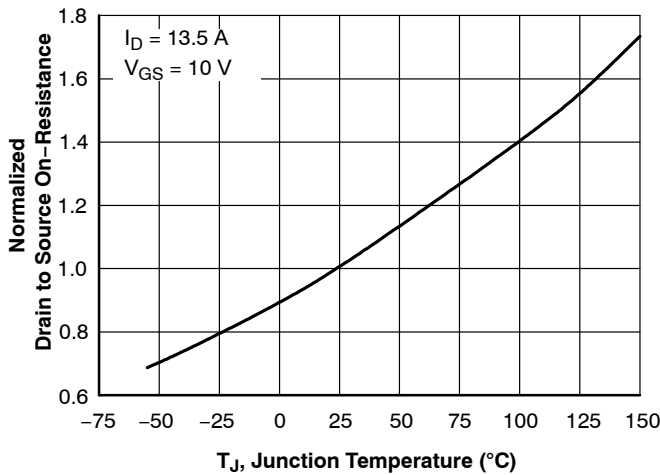


Figure 3. Normalized On-Resistance vs. Junction Temperature

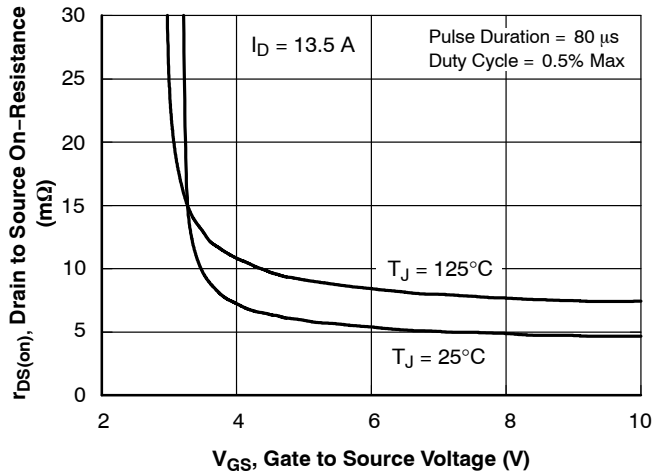


Figure 4. On-Resistance vs. Gate to Source Voltage

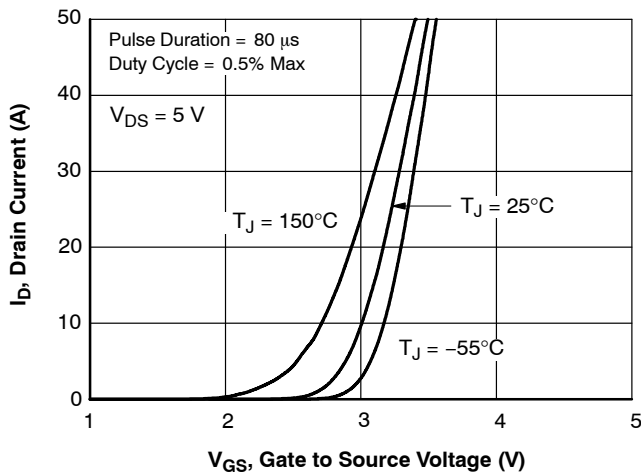


Figure 5. Transfer Characteristics

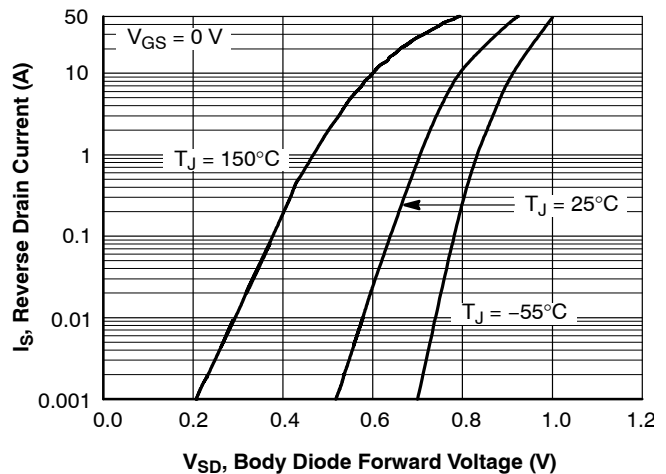


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

FDMC8462

TYPICAL CHARACTERISTICS (continued)

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

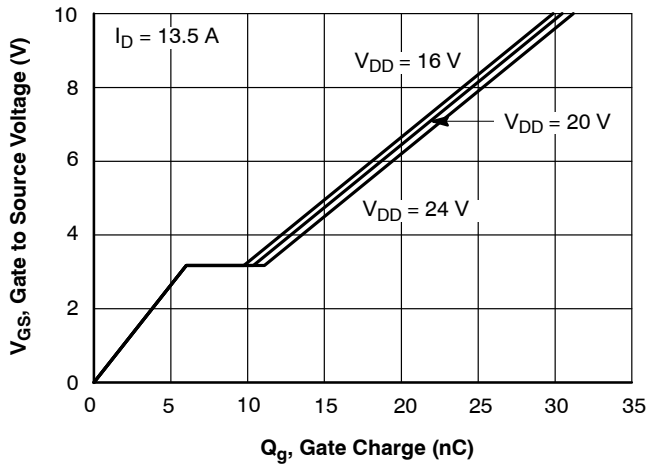


Figure 7. Gate Charge Characteristics

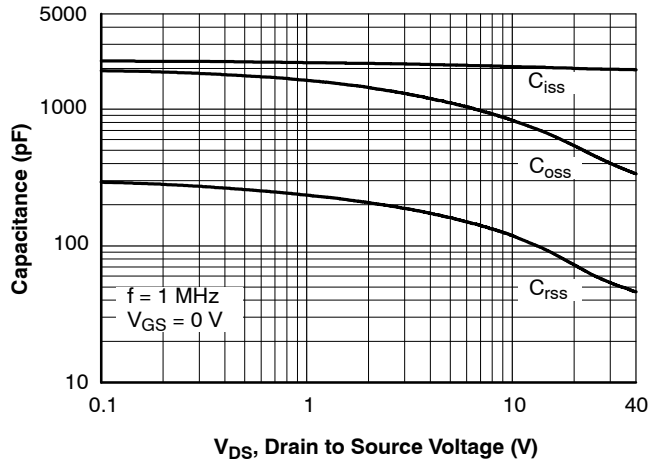


Figure 8. Capacitance vs. Drain to Source Voltage

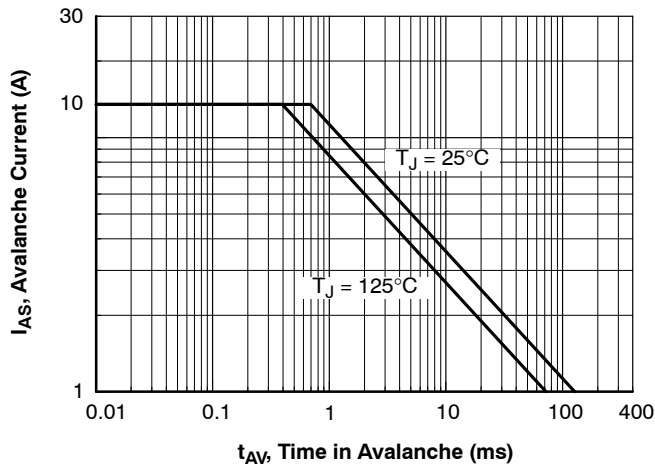


Figure 9. Unclamped Inductive Switching Capability

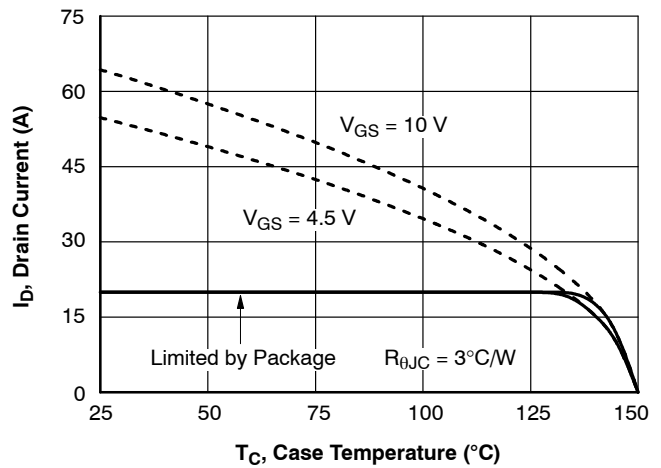


Figure 10. Maximum Continuous Drain Current vs Case Temperature

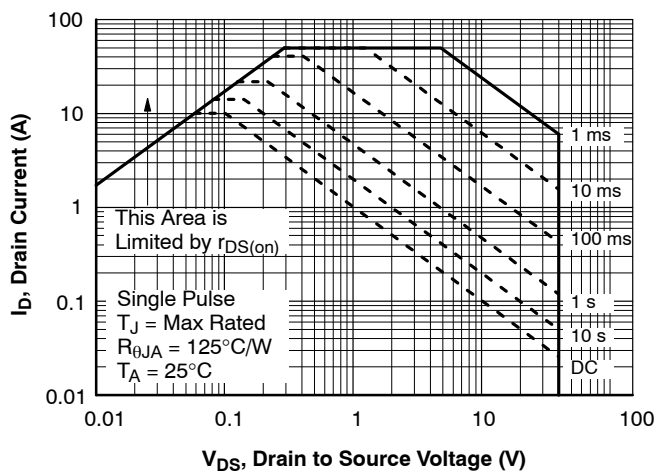


Figure 11. Forward Bias Safe Operating Area

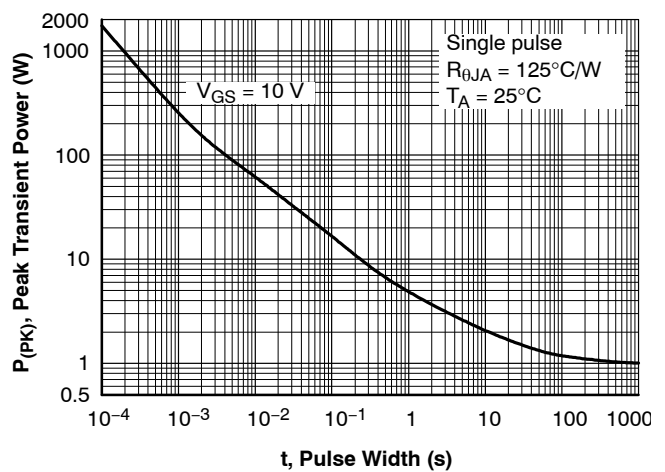


Figure 12. Single Pulse Maximum Power Dissipation

FDMC8462

TYPICAL CHARACTERISTICS (continued)

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

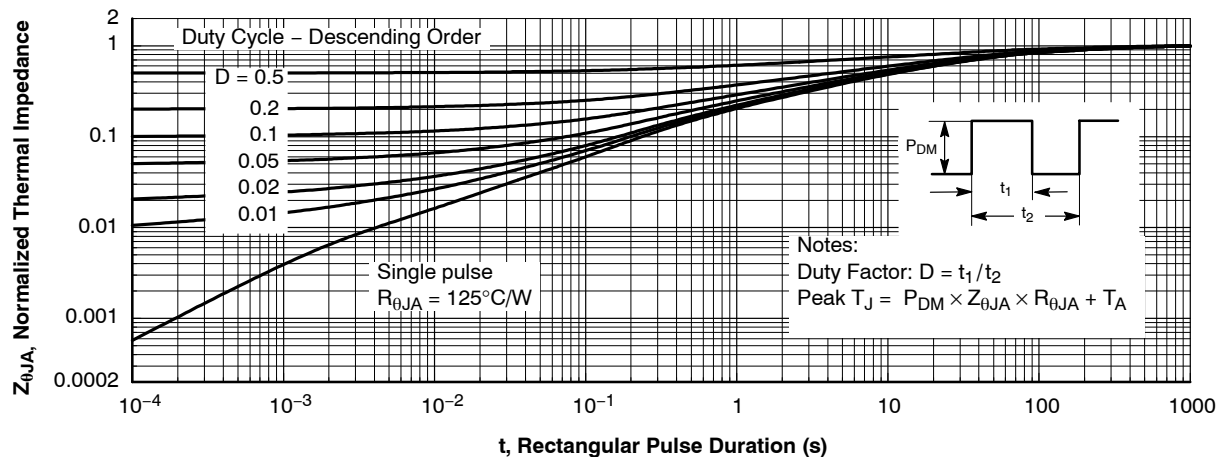


Figure 13. Transient Thermal Response Curve

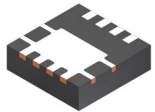
PACKAGE MARKING AND ORDERING INFORMATION

| Device | Device Marking | Package Type | Reel Size | Tape Width | Shipping [†] |
|----------|----------------|---|-----------|------------|-----------------------|
| FDMC8462 | FDMC8462 | PQFN8 3.3 x 3.3, 0.65P (Power 33) (Pb-Free/Halide Free) | 13" | 12 mm | 3000 / 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](#).

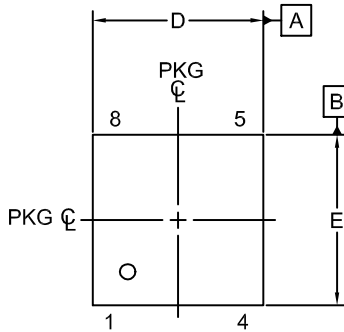


**MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS**



**PQFN8 3.3X3.3, 0.65P
CASE 483AK
ISSUE B**

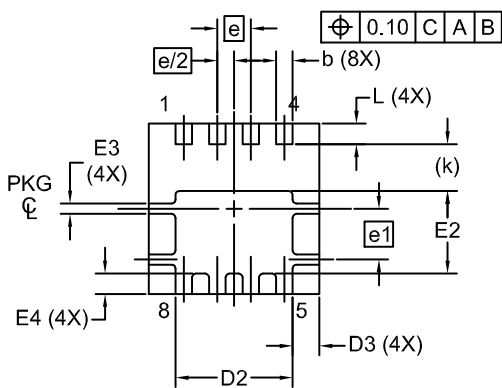
DATE 12 OCT 2021



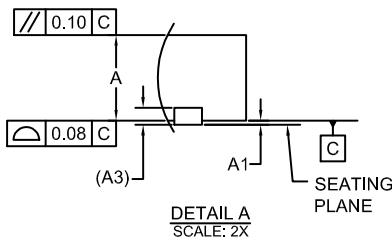
TOP VIEW



FRONT VIEW



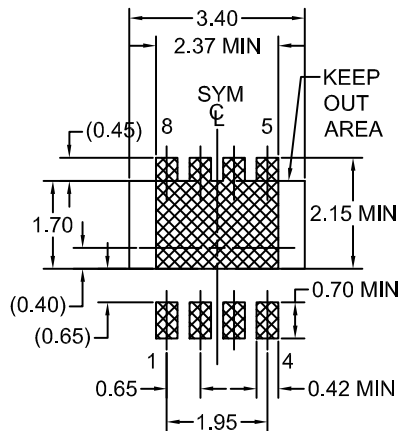
BOTTOM VIEW



DETAIL A
SCALE: 2X

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.



**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, SOLDERM/D.

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.00 | - | 0.05 |
| A3 | 0.20 REF | | |
| b | 0.27 | 0.32 | 0.37 |
| D | 3.20 | 3.30 | 3.40 |
| D2 | 2.17 | 2.27 | 2.37 |
| D3 | 0.42 | 0.52 | 0.62 |
| E | 3.20 | 3.30 | 3.40 |
| E2 | 1.50 | 1.60 | 1.70 |
| E3 | 0.10 | 0.20 | 0.30 |
| E4 | 0.29 | 0.39 | 0.49 |
| e | 0.65 BSC | | |
| e/2 | 0.325 BSC | | |
| e1 | 0.98 BSC | | |
| k | 0.91 REF | | |
| L | 0.30 | 0.40 | 0.50 |

| | | |
|-------------------------|-----------------------------|--|
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| DESCRIPTION: | PQFN8 3.3X3.3, 0.65P | PAGE 1 OF 1 |

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OUR CERTIFICATE

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