

MOSFET – N-Channel, Shielded Gate, POWERTRENCH®

100 V, 7.5 A, 103 mΩ

FDMC86116LZ, FDMC86116LZ-L701

General Description

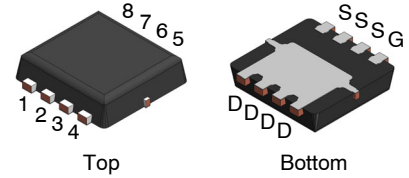
This N-Channel logic Level MOSFETs are produced using onsemi's advanced POWERTRENCH process that incorporates Shielded Gate technology. This process has been optimized for the on-state resistance and yet maintain superior switching performance. G-S zener has been added to enhance ESD voltage level.

Features

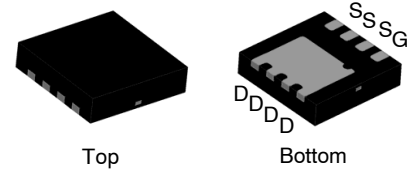
- Max $R_{DS(on)}$ = 103 mΩ at V_{GS} = 10 V, I_D = 3.3 A
- Max $R_{DS(on)}$ = 153 mΩ at V_{GS} = 4.5 V, I_D = 2.7 A
- HBM ESD Protection Level > 3 kV Typical (Note 1)
- 100% UIL Tested
- These Devices are Pb-Free and are RoHS Compliant

Applications

- DC-DC Conversion

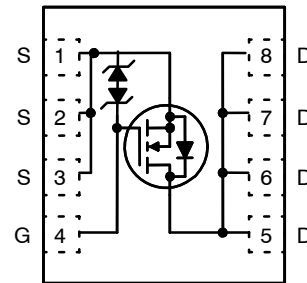


WDFN8 3.3x3.3, 0.65P
CASE 511DR
FDMC3612

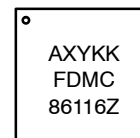


WDFN8 3.3x3.3, 0.65P
CASE 511DQ
FDMC3612-L701

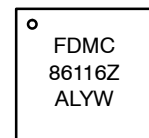
PIN ASSIGNMENT



MARKING DIAGRAM



FDMC86116LZ



FDMC86116LZ-L701

FDMC86116Z = Specific Device Code
A = Assembly Site
XY = 2-Digit Date Code
KK = 2-Digit Lot Run Traceability Code
L = Wafer Lot Number
YW = Assembly Start Week

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

1. The diode connected between gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

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

| Symbol | Parameter | Ratings | Unit | |
|----------------|--|--------------------------|--------------------------|---|
| V_{DS} | Drain to Source Voltage | 100 | V | |
| V_{GS} | Gate to Source Voltage | ± 20 | V | |
| I_D | Drain Current | Continuous | $T_C = 25^\circ\text{C}$ | A |
| | | Continuous (Note 3a) | $T_A = 25^\circ\text{C}$ | |
| | | Pulsed | | |
| E_{AS} | Single Pulse Avalanche Energy (Note 2) | 12 | mJ | |
| P_D | Power Dissipation | $T_C = 25^\circ\text{C}$ | 19 | W |
| | Power Dissipation (Note 3a) | $T_A = 25^\circ\text{C}$ | 2.3 | |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to +150 | $^\circ\text{C}$ | |

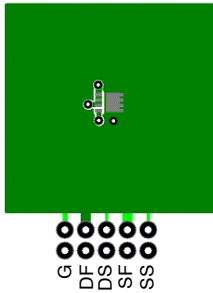
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

2. Starting $T_J = 25^\circ\text{C}$; N-ch: $L = 1\text{ mH}$, $I_{AS} = 5.0\text{ A}$, $V_{DD} = 90\text{ V}$, $V_{GS} = 10\text{ V}$.

THERMAL CHARACTERISTICS

| Symbol | Parameter | Ratings | Unit |
|-----------------|---|---------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 6.5 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 3a) | 53 | |

3. $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 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. $53^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper



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

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ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

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

OFF CHARACTERISTICS

| | | | | | | |
|--------------------------------------|---|--|-----|----|-----|-------|
| BV _{DSS} | Drain to Source Breakdown Voltage | I _D = 250 μA, V _{GS} = 0 V | 100 | – | – | V |
| ΔBV _{DSS} / ΔT _J | Breakdown Voltage Temperature Coefficient | I _D = 250 μA, referenced to 25°C | – | 73 | – | mV/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 80 V, V _{GS} = 0 V | – | – | 1 | μA |
| I _{GSS} | Gate to Source Leakage Current | V _{GS} = ±20 V, V _{DS} = 0 V | – | – | ±10 | μA |

ON CHARACTERISTICS

| | | | | | | |
|--|--|--|-----|-----|-----|-------|
| V _{GS(th)} | Gate to Source Threshold Voltage | V _{GS} = V _{DS} , I _D = 250 μA | 1.0 | 1.8 | 2.2 | V |
| ΔV _{GS(th)} / ΔT _J | Gate to Source Threshold Voltage Temperature Coefficient | I _D = 250 μA, referenced to 25°C | – | –6 | – | mV/°C |
| R _{DS(on)} | Static Drain to Source On Resistance | V _{GS} = 10 V, I _D = 3.3 A | – | 79 | 103 | mΩ |
| | | V _{GS} = 4.5 V, I _D = 2.7 A | – | 105 | 153 | |
| | | V _{GS} = 10 V, I _D = 3.3 A, T _J = 125°C | – | 136 | 178 | |
| g _{FS} | Forward Transconductance | V _{DS} = 5 V, I _D = 3.3 A | – | 11 | – | S |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|------------------|------------------------------|--|---|-----|-----|----|
| C _{iss} | Input Capacitance | V _{DS} = 50 V, V _{GS} = 0 V, f = 1 MHz | – | 232 | 310 | pF |
| C _{oss} | Output Capacitance | | – | 45 | 60 | pF |
| C _{rss} | Reverse Transfer Capacitance | | – | 2.4 | 5 | pF |
| R _g | Gate Resistance | | – | 0.7 | – | Ω |

SWITCHING CHARACTERISTICS

| | | | | | | |
|---------------------|-------------------------------|--|---|-----|----|----|
| t _{d(on)} | Turn-On Delay Time | V _{DD} = 50 V, I _D = 3.3 A, V _{GS} = 10 V, R _{GEN} = 6 Ω | – | 4.5 | 10 | ns |
| t _r | Rise Time | | – | 1.3 | 10 | ns |
| t _{d(off)} | Turn-Off Delay Time | | – | 10 | 20 | ns |
| t _f | Fall Time | | – | 1.4 | 10 | ns |
| Q _{g(TOT)} | Total Gate Charge | V _{GS} = 0 V to 10 V, V _{DD} = 50 V, I _D = 3.3 A | – | 4 | 6 | nC |
| Q _{g(TOT)} | Total Gate Charge | V _{GS} = 0 V to 4.5 V, V _{DD} = 50 V, I _D = 3.3 A | – | 2 | 3 | nC |
| Q _{gs} | Total Gate Charge | V _{DD} = 50 V, I _D = 3.3 A | – | 0.8 | – | nC |
| Q _{gd} | Gate to Drain "Miller" Charge | | – | 0.7 | – | nC |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|-----------------|---------------------------------------|--|---|------|-----|----|
| V _{SD} | Source to Drain Diode Forward Voltage | V _{GS} = 0 V, I _S = 3.3 A (Note 4) | – | 0.85 | 1.3 | V |
| | | V _{GS} = 0 V, I _S = 2 A (Note 4) | – | 0.82 | 1.2 | |
| t _{rr} | Reverse Recovery Time | I _F = 3.3 A, di/dt = 100 A/μs | – | 33 | 54 | ns |
| Q _{rr} | Reverse Recovery Charge | | – | 23 | 38 | 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. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.

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TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

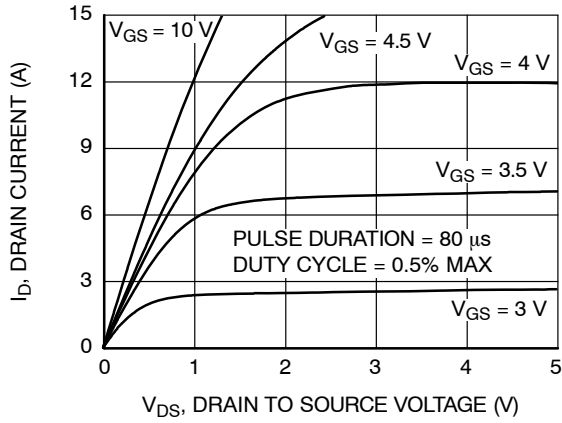


Figure 1. On Region Characteristics

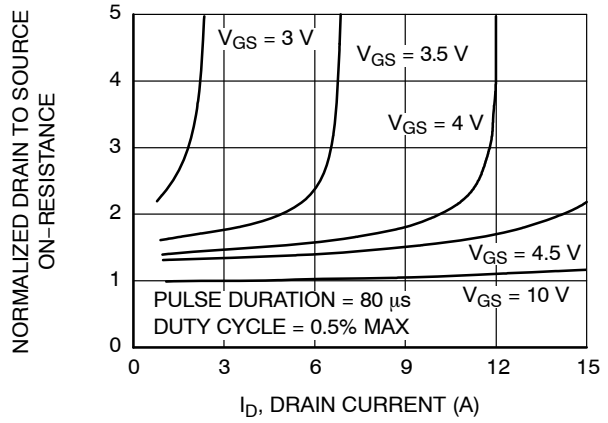


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

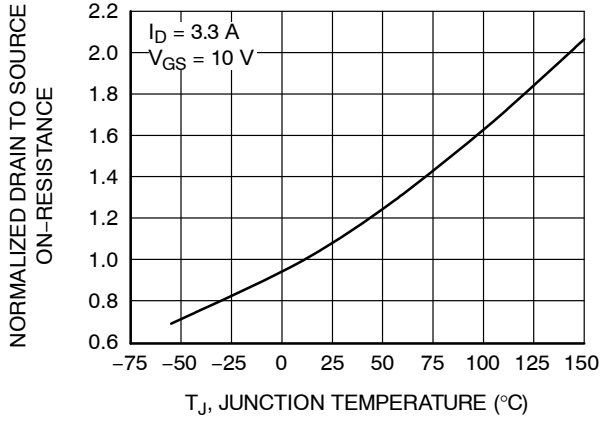


Figure 3. Normalized On Resistance vs. Junction Temperature

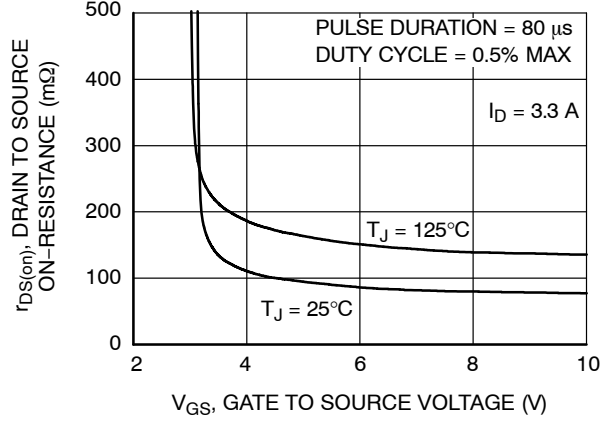


Figure 4. On-Resistance vs. Gate to Source Voltage

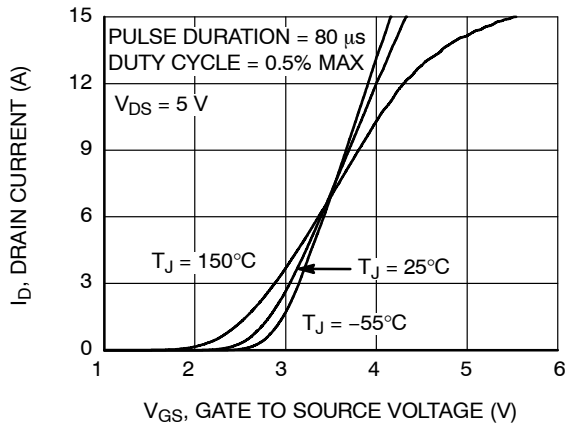


Figure 5. Transfer Characteristics

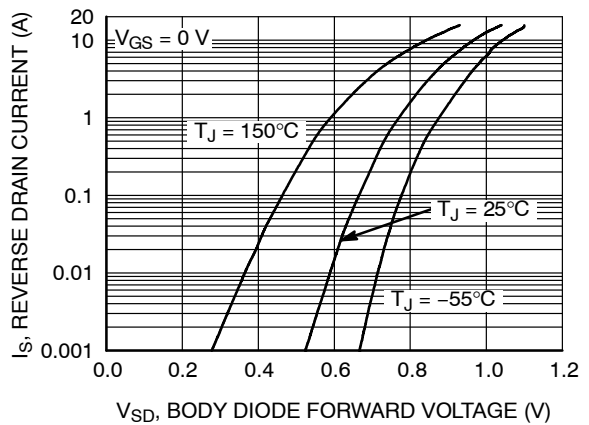


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

FDMC86116LZ, FDMC86116LZ-L701

TYPICAL CHARACTERISTICS (CONTINUED)

($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

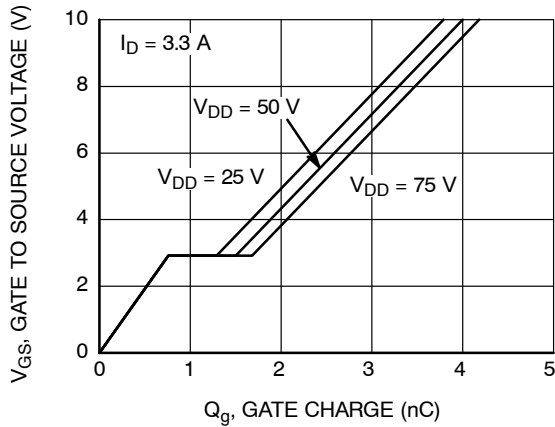


Figure 7. Gate Charge Characteristics

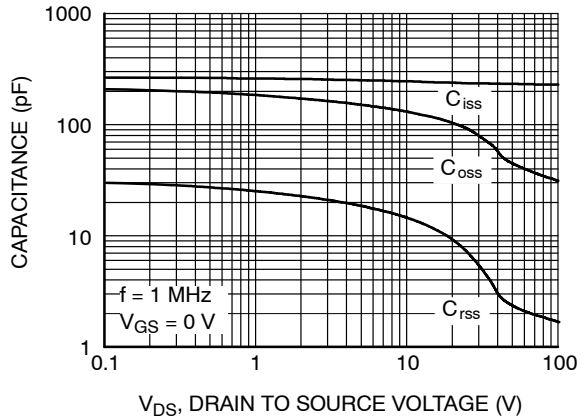


Figure 8. Capacitance vs. Drain to Source Voltage

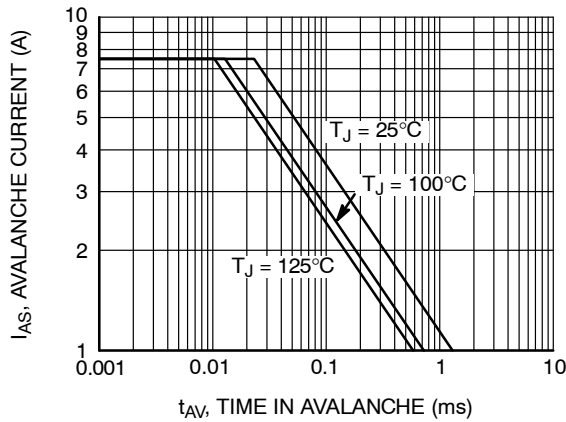


Figure 9. Unclamped Inductive Switching Capability

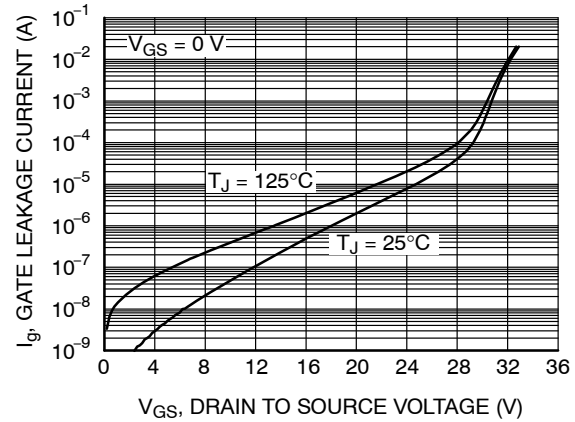


Figure 10. Gate Leakage Current vs. Gate to Source Voltage

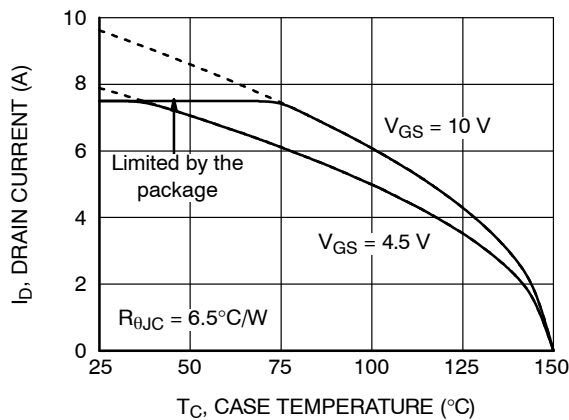


Figure 11. Maximum Continuous Drain Current vs. Case Temperature

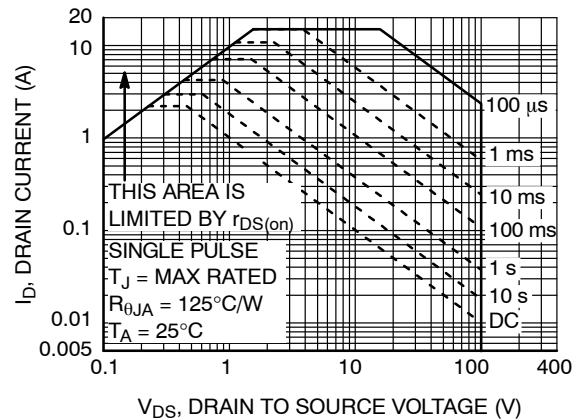


Figure 12. Forward Bias Safe Operating Area

FDMC86116LZ, FDMC86116LZ-L701

TYPICAL CHARACTERISTICS (CONTINUED)

($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

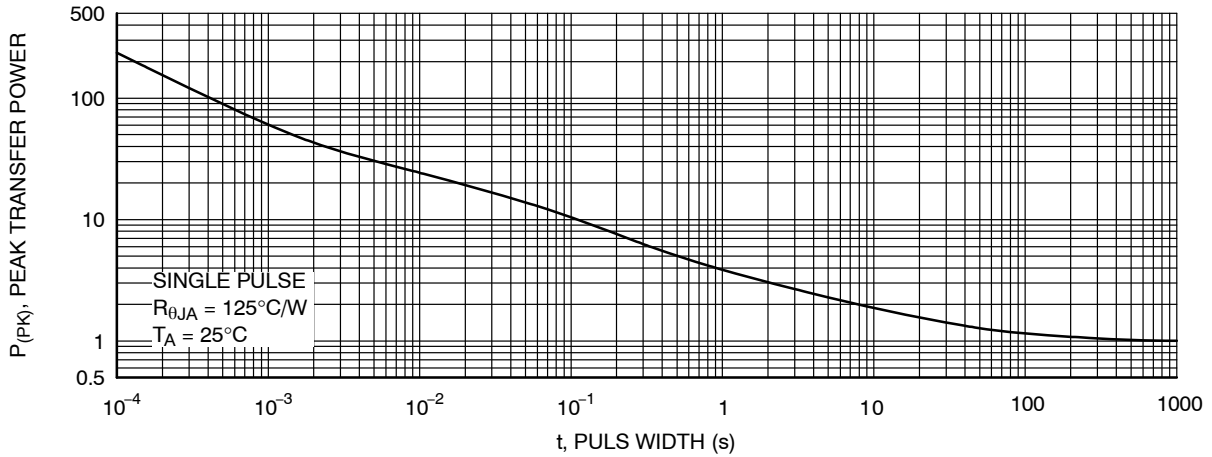


Figure 13. Single pulse Maximum Power Dissipation

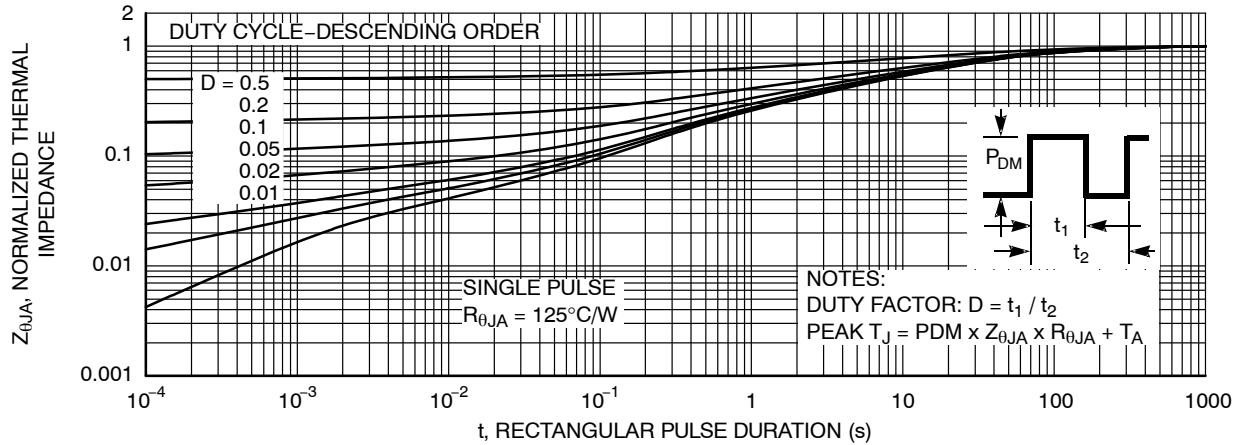


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

ORDERING INFORMATION

| Device | Device Marking | Package Type | Reel Size | Tape Width | Shipping [†] |
|------------------|----------------|---|-----------|------------|-----------------------|
| FDMC86116LZ | FDMC86116Z | WDFN8 3.3x3.3, 0.65P Power 33 (Pb-Free) | 13" | 12 mm | 3000 / Tape & Reel |
| FDMC86116LZ-L701 | FDMC86116Z | WDFN8 3.3x3.3, 0.65P Power 33 (Pb-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](#).

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®

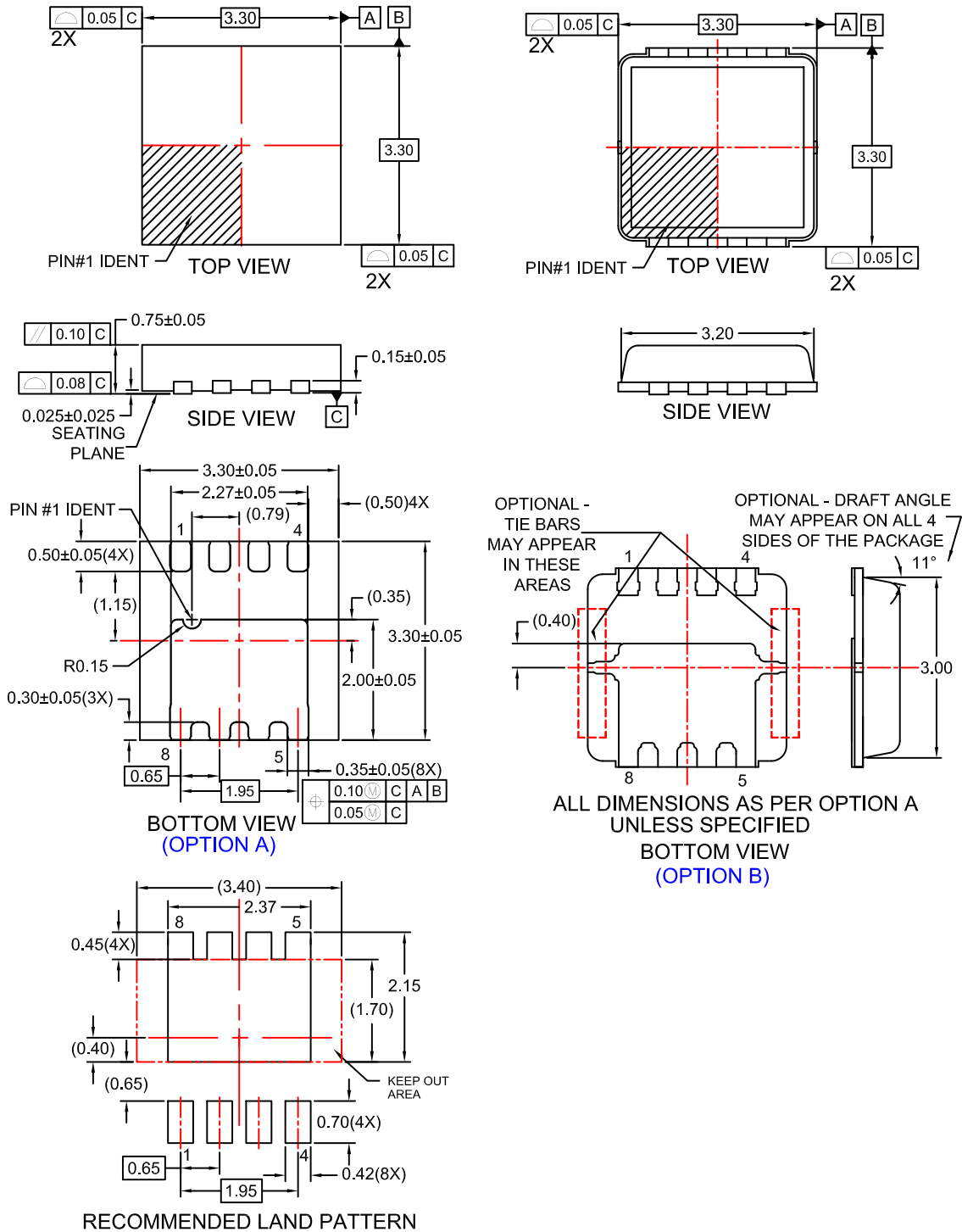


WDFN8 3.3x3.3, 0.65P

CASE 511DQ

ISSUE O

DATE 31 OCT 2016

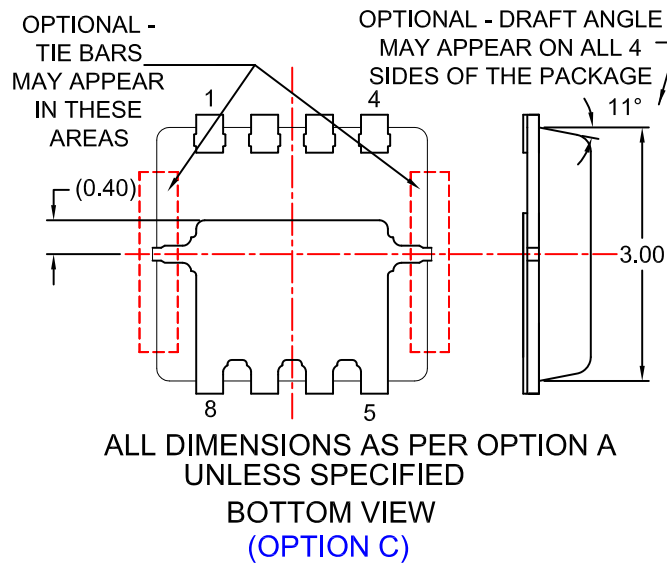
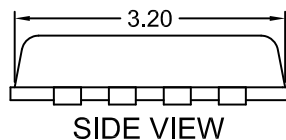
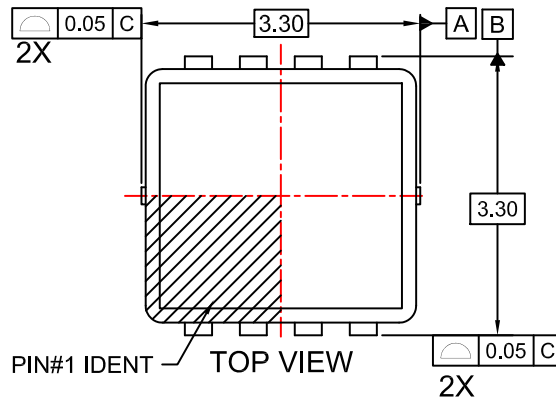


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CASE 511DQ
ISSUE O

DATE 31 OCT 2016



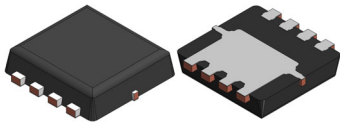
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- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN
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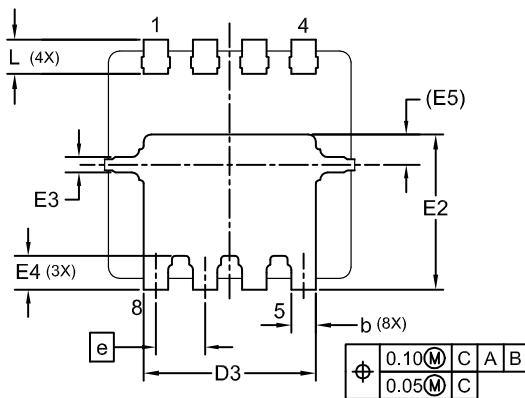
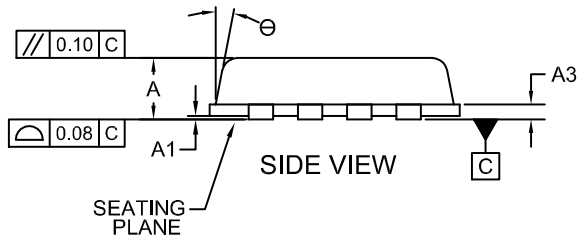
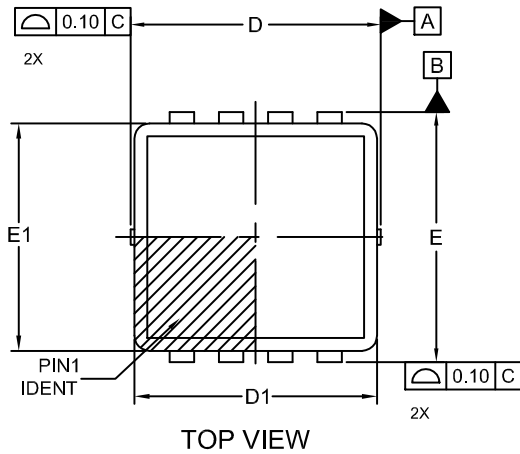
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MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



WDFN8 3.3x3.3, 0.65P
CASE 511DR
ISSUE B

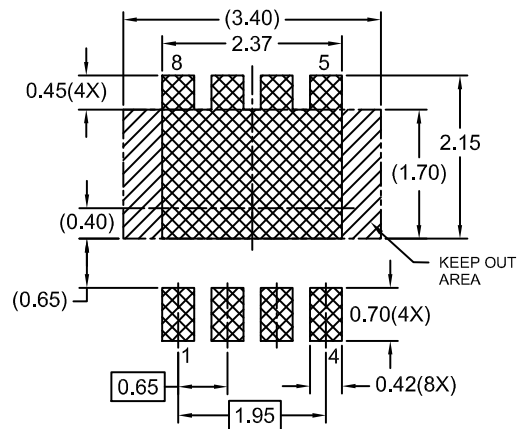
DATE 02 FEB 2022



| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN | NOM | MAX |
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | - | 0.05 |
| A3 | 0.15 | 0.20 | 0.25 |
| b | 0.27 | 0.32 | 0.37 |
| D | 3.20 | 3.30 | 3.40 |
| D1 | 3.10 | 3.20 | 3.30 |
| D3 | 2.17 | 2.27 | 2.37 |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 2.90 | 3.00 | 3.10 |
| E2 | 1.95 | 2.05 | 2.15 |
| E3 | 0.15 | 0.20 | 0.25 |
| E4 | 0.30 | 0.40 | 0.50 |
| E5 | 0.40 REF | | |
| e | 0.65 BSC | | |
| L | 0.30 | 0.40 | 0.50 |
| Θ | 0° | - | 12° |

NOTES:

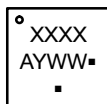
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RECOMMENDED LAND PATTERN

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GENERIC MARKING DIAGRAM*



- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

*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.

(Note: Microdot may be in either location)

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