

MOSFET – N-Channel, UltraFET Trench

150 V, 27 A, 47 mΩ

FDMS2572

General Description

UltraFET™ devices combine characteristics that enable benchmark efficiency in power conversion applications. Optimized for $r_{DS(on)}$, low ESR, low total and Miller gate charge, these devices are ideal for high frequency DC to DC converters.

Features

- Max $r_{DS(on)}$ = 47 mΩ at $V_{GS} = 10\text{ V}$, $I_D = 4.5\text{ A}$
- Max $r_{DS(on)}$ = 53 mΩ at $V_{GS} = 6\text{ V}$, $I_D = 4.5\text{ A}$
- Low Miller Charge
- Optimized Efficiency at High Frequencies
- UIS Capability (Single Pulse and Repetitive Pulse)
- This Device is Pb-Free and is RoHS Compliant

Applications

- Distributed Power Architectures and VRMs
- Primary Switch for 24 V and 48 V Systems
- High Voltage Synchronous Rectifier

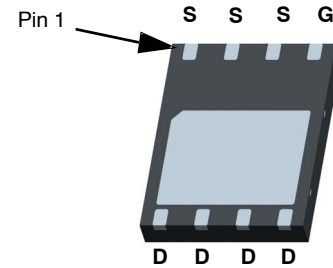
MOSFET MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Ratings | Unit |
|----------------|--|-----------------------|------------------|
| V_{DS} | Drain to Source Voltage | 150 | V |
| V_{GS} | Gate to Source Voltage | ±20 | V |
| I_D | Drain Current: – Continuous (Package limited) $T_C = 25^\circ\text{C}$ – Continuous (Silicon limited) $T_C = 25^\circ\text{C}$ – Continuous, $T_A = 25^\circ\text{C}$ (Note 1a) – Pulsed | 27 27 4.5 30 | A |
| E_{AS} | Single Pulse Avalanche Energy (Note 3) | 150 | mJ |
| P_D | Power Dissipation: $T_C = 25^\circ\text{C}$ $T_A = 25^\circ\text{C}$ (Note 1a) | 78 2.5 | W |
| 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

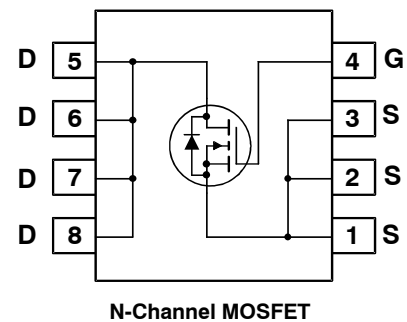
| Symbol | Parameter | Ratings | Unit |
|-----------------|---|---------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 1.6 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 50 | |



Power 56 (Bottom View)

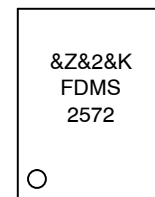
WDFN8 5x6, 1.27P
CASE 506DP

ELECTRICAL CONNECTION



N-Channel MOSFET

MARKING DIAGRAM



&Z = Assembly Plant Code
&2 = Numeric Date Code
&K = Lot Code
FDMS2572 = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

FDMS2572

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

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|-------------------------------------|---|--|-----|-----|------|-------|
| OFF CHARACTERISTICS | | | | | | |
| BV _{DSS} | Drain to Source Breakdown Voltage | I _D = 250 μA, V _{GS} = 0 V | 150 | | | V |
| ΔBV _{DSS} /ΔT _J | Breakdown Voltage Temperature Coefficient | I _D = 250 μA, referenced to 25°C | | 180 | | mV/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 120 V, V _{GS} = 0 V | | | 1 | μA |
| I _{GSS} | Gate to Source Leakage Current | V _{GS} = ±20 V, V _{DS} = 0 V | | | ±100 | nA |

ON CHARACTERISTICS (Note 2)

| | | | | | | |
|---------------------------------------|--|---|---|------|-----|-------|
| V _{GS(th)} | Gate to Source Threshold Voltage | V _{GS} = V _{DS} , I _D = 250 μA | 2 | 3 | 4 | V |
| ΔV _{GS(th)} /ΔT _J | Gate to Source Threshold Voltage Temperature Coefficient | I _D = 250 μA, referenced to 25 °C | | -9.8 | | mV/°C |
| r _{DS(on)} | Static Drain to Source On Resistance | V _{GS} = 10 V, I _D = 4.5 A | | 36 | 47 | mΩ |
| | | V _{GS} = 6 V, I _D = 4.5 A | | 39 | 53 | |
| | | V _{GS} = 10 V, I _D = 4.5 A, T _J = 125 °C | | 69 | 103 | |
| g _{FS} | Forward Transconductance | V _{DS} = 10 V, I _D = 4.5 A | | 14 | | S |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|------------------|------------------------------|---|-----|------|------|----|
| C _{iss} | Input Capacitance | V _{DS} = 75 V, V _{GS} = 0 V, f = 1 MHz | | 1960 | 2610 | pF |
| C _{oss} | Output Capacitance | | | 130 | 175 | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 30 | 45 | pF |
| R _g | Gate Resistance | f = 1 MHz | 0.1 | 1.3 | 2.6 | Ω |

SWITCHING CHARACTERISTICS

| | | | | | | |
|---------------------|-------------------------------|---|--|----|----|----|
| t _{d(on)} | Turn-On Delay Time | V _{DD} = 75 V, I _D = 1.0 A, V _{GS} = 10 V, R _{GEN} = 6 Ω | | 11 | 20 | ns |
| t _r | Rise Time | | | 8 | 16 | ns |
| t _{d(off)} | Turn-Off Delay Time | | | 38 | 61 | ns |
| t _f | Fall Time | | | 31 | 50 | ns |
| Q _{g(TOT)} | Total Gate Charge at 10 V | V _{GS} = 0 V to 10 V, V _{DD} = 75 V, I _D = 4.5 A | | 31 | 43 | nC |
| Q _{gs} | Gate to Source Gate Charge | V _{DD} = 75 V, I _D = 4.5 A | | 9 | | nC |
| Q _{gd} | Gate to Drain "Miller" Charge | | | 7 | | nC |

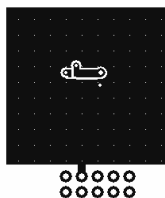
DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|-----------------|---------------------------------------|--|--|-----|-----|----|
| V _{SD} | Source to Drain Diode Forward Voltage | V _{GS} = 0 V, I _S = 2.2 A (Note 2) | | 0.7 | 1.0 | V |
| t _{rr} | Reverse Recovery Time | I _F = 4.5 A, di/dt = 100 A/μs | | 67 | 101 | ns |
| Q _{rr} | Reverse Recovery Charge | | | 130 | 195 | nC |

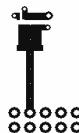
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

- R_{θJA} is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR-4 material. R_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design.



- 50°C/W when mounted on a 1 in² pad of 2 oz copper.



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

- Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
- E_{AS} of 150 mJ is based on starting T_J = 25°C, L = 3 mH, I_{AS} = 10 A, V_{DD} = 150 V, V_{GS} = 10 V.

FDMS2572

ORDERING INFORMATION AND PACKAGE MARKING

| Device | Device Marking | Package | Shipping† |
|----------|----------------|----------------------------|--------------------------|
| FDMS2572 | FDMS2572 | WDFN8 5x6, 1.27P (Pb-Free) | 3000 Units / 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.

TYPICAL CHARACTERISTICS

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

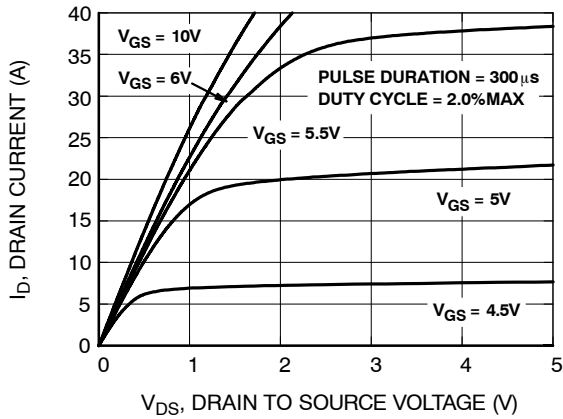


Figure 1. On-Region Characteristics

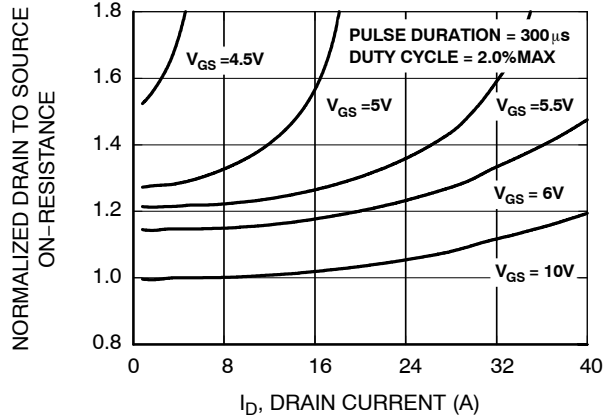


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

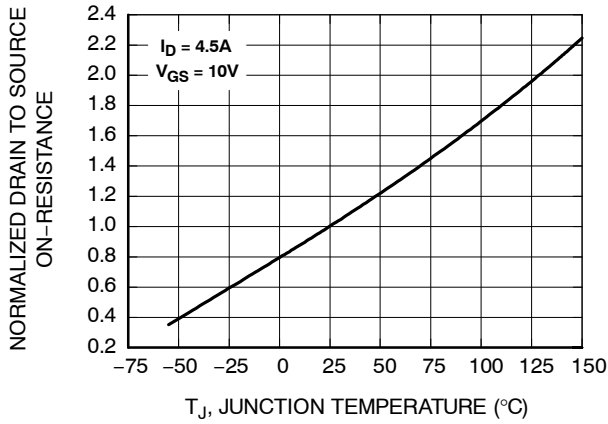


Figure 3. Normalized On-Resistance vs. Junction Temperature

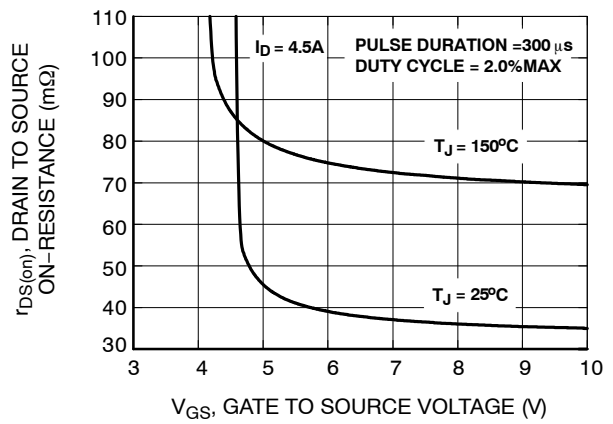


Figure 4. On-Resistance vs. Gate to Source Voltage

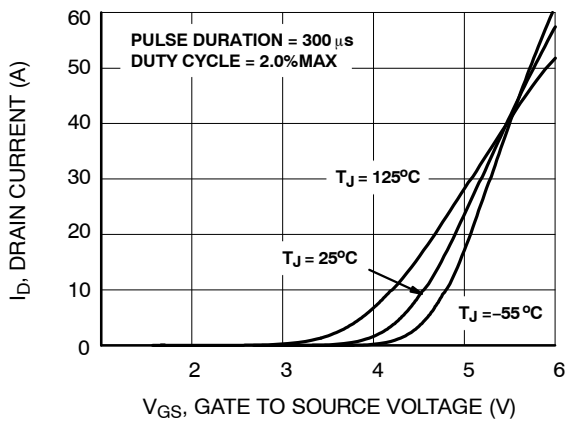


Figure 5. Transfer Characteristics

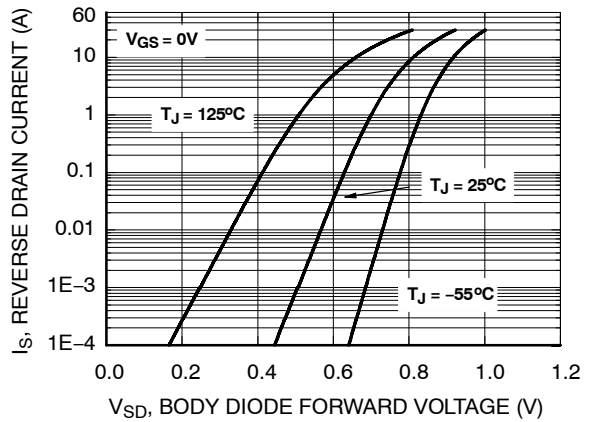


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (continued)

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

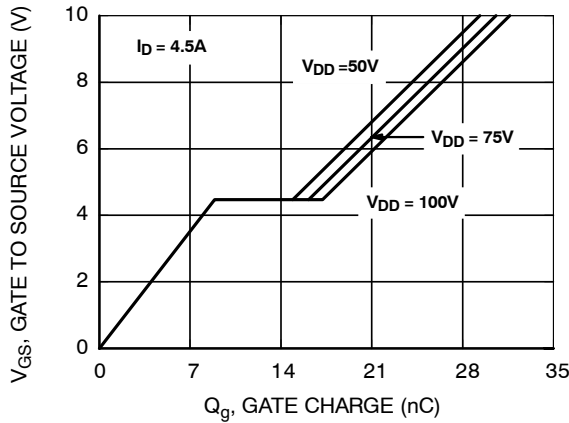


Figure 7. Gate Charge Characteristics

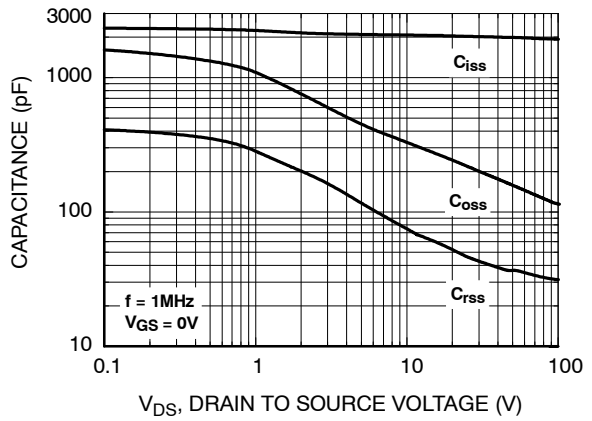


Figure 8. Capacitance vs. Drain to Source Voltage

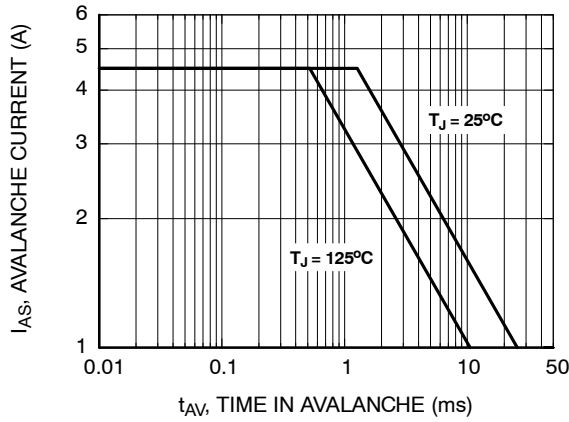


Figure 9. Unclamped Inductive Switching Capability

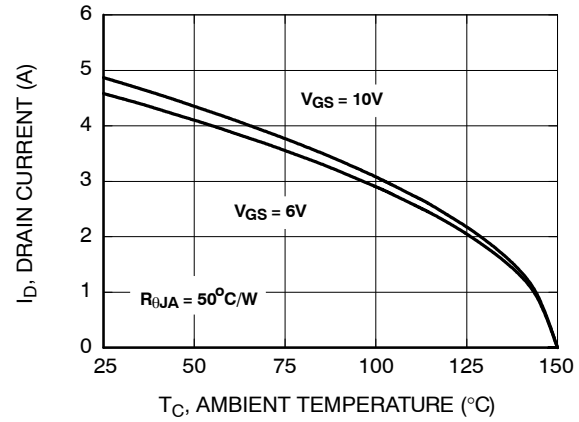


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

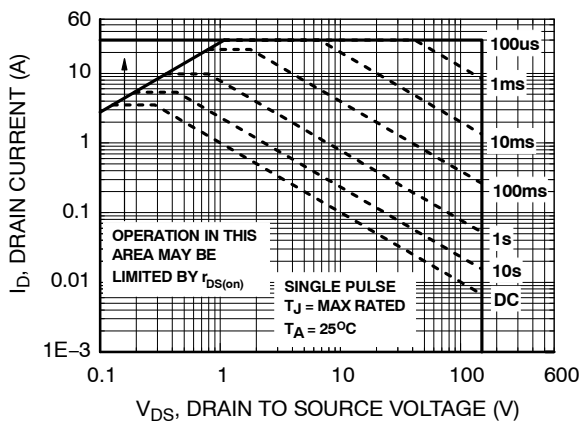


Figure 11. Forward Bias Safe Operating Area

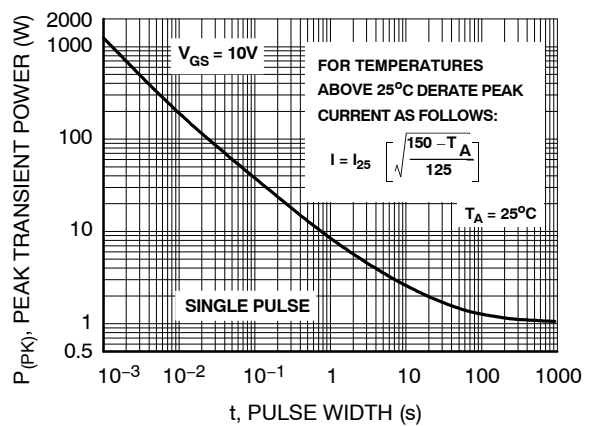


Figure 12. Single Pulse Maximum Power Dissipation

FDMS2572

TYPICAL CHARACTERISTICS (continued)

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

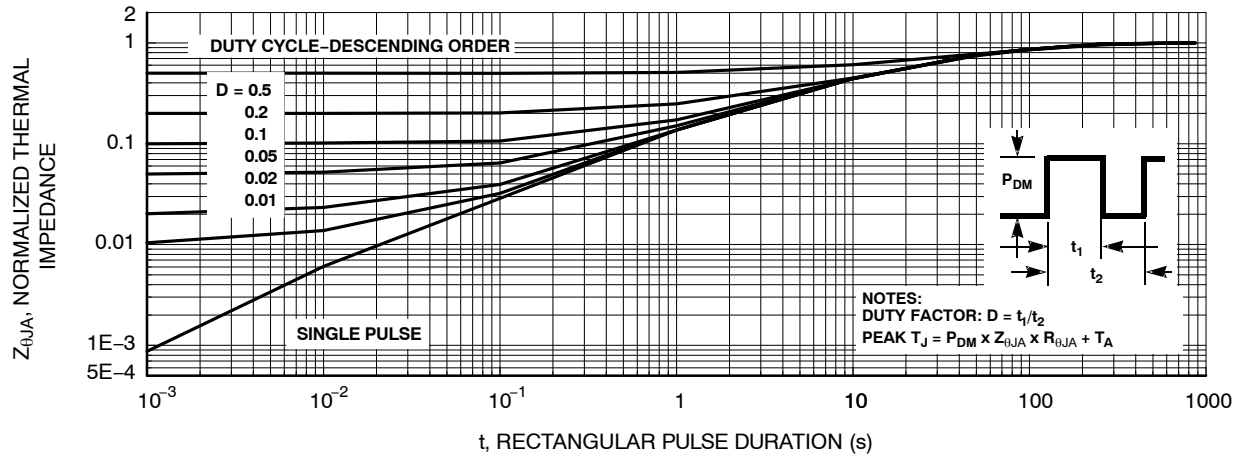


Figure 13. Transient Thermal Response Curve

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MECHANICAL CASE OUTLINE

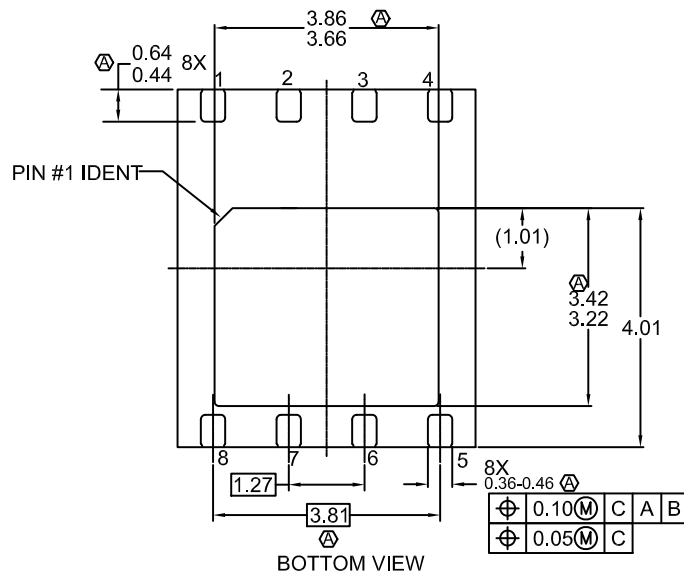
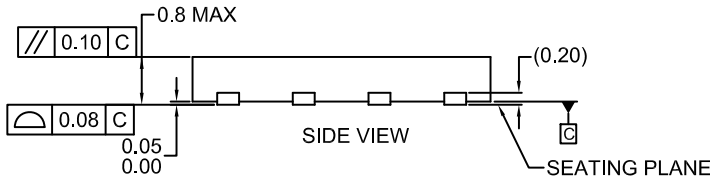
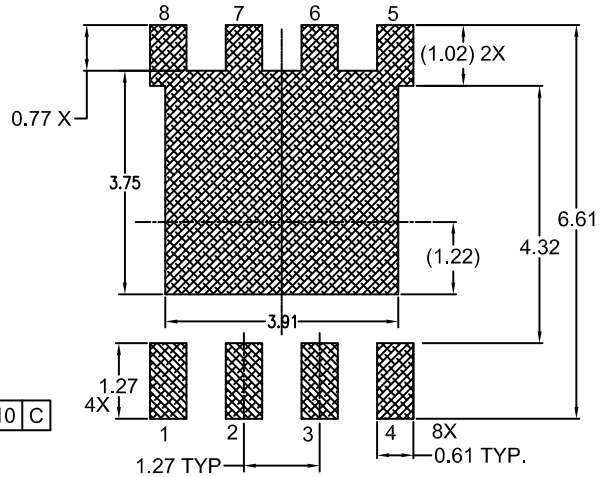
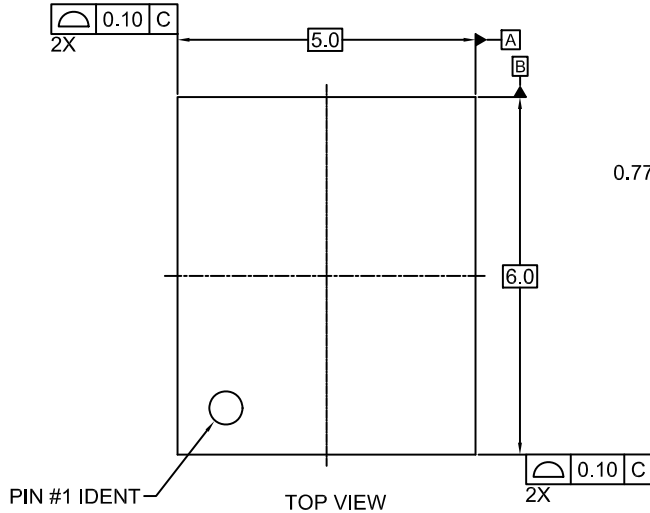
PACKAGE DIMENSIONS

ON Semiconductor®



WDFN8 5x6, 1.27P
CASE 506DP
ISSUE O

DATE 31 AUG 2016



NOTES:

- Ⓐ DOES NOT FULLY CONFORM TO JEDEC REGISTRATION, MO-229.
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- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994
- D. TERMINALS 5,6,7 AND 8 ARE TIED TO THE EXPOSED PADDLE

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