



**THE DATASHEET OF
FDMC007N30D**



MOSFET – Dual, N-Channel, POWERTRENCH®

Q1: 30 V, 11.6 mΩ; Q2: 30 V, 6.4 mΩ

FDMC007N30D

General Description

This device includes two specialized N-Channel MOSFETs in a dual Power33 (3mm × 3mm MLP) package. The switch node has been internally connected to enable easy placement and routing of synchronous buck converters. The control MOSFET (Q1) and synchronous MOSFET (Q2) have been designed to provide optimal power efficiency.

Features

- Q1: N-Channel
- Max $R_{DS(on)}$ = 11.6 mΩ at $V_{GS} = 10\text{ V}$, $I_D = 10\text{ A}$
- Max $R_{DS(on)}$ = 13.3 mΩ at $V_{GS} = 4.5\text{ V}$, $I_D = 9\text{ A}$
- Q2: N-Channel
- Max $R_{DS(on)}$ = 6.4 mΩ at $V_{GS} = 10\text{ V}$, $I_D = 16\text{ A}$
- Max $R_{DS(on)}$ = 7.0 mΩ at $V_{GS} = 4.5\text{ V}$, $I_D = 15\text{ A}$
- RoHS Compliant

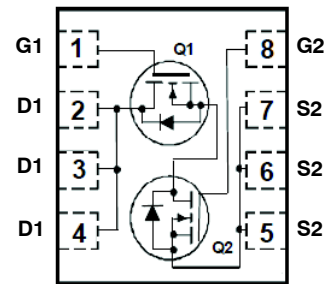
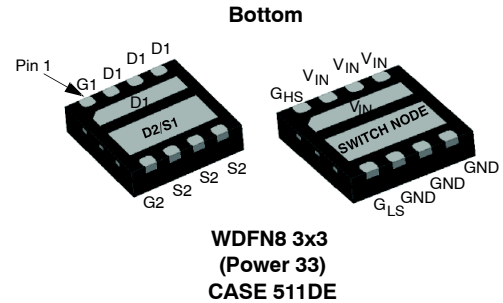
Applications

- Mobile Computing
- Mobile Internet Devices
- General Purpose Point of Load

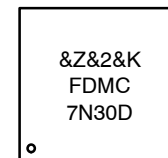
MOSFET MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Q1 | Q2 | Unit |
|----------------|--|------------------|------------------|------------------|
| V_{DS} | Drain to Source Voltage | 30 | 30 | V |
| V_{GS} | Gate to Source Voltage (Note 4) | ±12 | ±12 | V |
| I_D | Drain Current: | | | A |
| | – Continuous, $T_C = 25^\circ\text{C}$ (Note 6) | 29 | 46 | |
| | – Continuous, $T_C = 100^\circ\text{C}$ (Note 6) | 18 | 29 | |
| | – Continuous, $T_A = 25^\circ\text{C}$ (Note 1a) | 10 | 16 | |
| | – Pulsed (Note 5) | 113 | 302 | |
| E_{AS} | Single Pulse Avalanche Energy (Note 3) | 24 | 54 | mJ |
| P_D | Power Dissipation for Single Operation: | | | W |
| | $T_A = 25^\circ\text{C}$ | 1.9 (Note 1a) | 2.5 (Note 1b) | |
| | $T_A = 25^\circ\text{C}$ | 0.7 (Note 1c) | 1.0 (Note 1d) | |
| 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.



MARKING DIAGRAM



- &Z = Assembly Plant Code
- &2 = Data Code (Year & Week)
- &K = Lot Traceability Code
- FDMC007N30D = Specific Device Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|-------------|-------------------|--------------------|
| FDMC007N30D | WDFN-8 (Power 33) | 3000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](#).

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THERMAL CHARACTERISTICS

| Symbol | Parameter | Q1 | Q2 | Unit |
|-----------------|---|---------------|---------------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 8.2 | 6.1 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 65 (Note 1a) | 50 (Note 1b) | |
| | | 180 (Note 1c) | 125 (Note 1d) | |

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

| Symbol | Parameter | Test Condition | Type | Min | Typ | Max | Unit |
|--------|-----------|----------------|------|-----|-----|-----|------|
|--------|-----------|----------------|------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | | |
|--------------------------------|---|--|----------|----------|----------|------------------------|---------------|
| BV_{DSS} | Drain to Source Breakdown Voltage | $I_D = 250 \mu\text{A}$, $V_{GS} = 0 \text{ V}$ $I_D = 250 \mu\text{A}$, $V_{GS} = 0 \text{ V}$ | Q1 Q2 | 30 30 | | | V |
| $\Delta BV_{DSS} / \Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$, referenced to 25°C $I_D = 250 \mu\text{A}$, referenced to 25°C | Q1 Q2 | | 15 16 | | mV/°C |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 24 \text{ V}$, $V_{GS} = 0 \text{ V}$ | Q1 Q2 | | | 1 1 | μA |
| I_{GSS} | Gate to Source Leakage Current, Forward | $V_{GS} = \pm 12 \text{ V}$, $V_{DS} = 0 \text{ V}$ | Q1 Q2 | | | ± 100 ± 100 | nA |

ON CHARACTERISTICS

| | | | | | | | |
|----------------------------------|--|---|----------|------------|--------------------|----------------------|------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 250 \mu\text{A}$ $V_{GS} = V_{DS}$, $I_D = 250 \mu\text{A}$ | Q1 Q2 | 1.0 1.0 | 1.3 1.8 | 3.0 3.0 | V |
| $\Delta V_{GS(th)} / \Delta T_J$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$, referenced to 25°C $I_D = 250 \mu\text{A}$, referenced to 25°C | Q1 Q2 | | -4 -4 | | mV/°C |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS} = 10 \text{ V}$, $I_D = 10 \text{ A}$ $V_{GS} = 4.5 \text{ V}$, $I_D = 9 \text{ A}$ $V_{GS} = 10 \text{ V}$, $I_D = 10 \text{ A}$, $T_J = 125^\circ\text{C}$ | Q1 | | 7.7 8.9 10.8 | 11.6 13.3 16.3 | m Ω |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS} = 10 \text{ V}$, $I_D = 16 \text{ A}$ $V_{GS} = 4.5 \text{ V}$, $I_D = 15 \text{ A}$ $V_{GS} = 10 \text{ V}$, $I_D = 16 \text{ A}$, $T_J = 125^\circ\text{C}$ | Q2 | | 4.4 5.4 6.2 | 6.4 7.0 9.0 | m Ω |
| g_{FS} | Forward Transconductance | $V_{DD} = 5 \text{ V}$, $I_D = 10 \text{ A}$ $V_{DD} = 5 \text{ V}$, $I_D = 16 \text{ A}$ | Q1 Q2 | | 46 70 | | S |

DYNAMIC CHARACTERISTICS

| | | | | | | | |
|-----------|------------------------------|--|----------|------------|-------------|--------------|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ | Q1 Q2 | | 792 1685 | 1110 2360 | pF |
| C_{oss} | Output Capacitance | | Q1 Q2 | | 230 467 | 325 655 | pF |
| C_{rss} | Reverse Transfer Capacitance | | Q1 Q2 | | 20 36 | 30 50 | pF |
| R_g | Gate Resistance | $f = 1 \text{ MHz}$ | Q1 Q2 | 0.1 0.1 | 2.0 1.2 | 4.0 2.4 | Ω |

SWITCHING CHARACTERISTICS

| | | | | | | | |
|--------------|---------------------|--|----------|--|----------|----------|----|
| $t_{d(on)}$ | Turn-On Delay Time | Q1 $V_{DD} = 15 \text{ V}$, $I_D = 10 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = 6 \Omega$ | Q1 Q2 | | 7 10 | 14 20 | ns |
| t_r | Rise Time | | Q1 Q2 | | 2 3 | 10 10 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | Q2 $V_{DD} = 15 \text{ V}$, $I_D = 16 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = 6 \Omega$ | Q1 Q2 | | 19 24 | 33 39 | ns |
| t_f | Fall Time | | Q1 Q2 | | 2 3 | 10 10 | ns |

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

| Symbol | Parameter | Test Condition | Type | Min | Typ | Max | Unit |
|----------------------------------|-------------------------------|---|------|-----|-----|-----|------|
| SWITCHING CHARACTERISTICS | | | | | | | |
| $Q_{g(\text{TOT})}$ | Total Gate Charge | $V_{GS} = 0\text{ V to }10\text{ V}$ $V_{GS} = 0\text{ V to }4.5\text{ V}$ | Q1 | | 12 | 17 | nC |
| | | | Q2 | | 24 | 34 | |
| Q_{gs} | Gate to Source Charge | | Q1 | | 5.5 | 7.7 | nC |
| | | | Q2 | | 11 | 16 | |
| Q_{gd} | Gate to Drain "Miller" Charge | | Q1 | | 1.7 | | nC |
| | | | Q2 | | 4.4 | | |
| Q_{gd} | Gate to Drain "Miller" Charge | | Q1 | | 1.3 | | nC |
| | | | Q2 | | 2.7 | | |

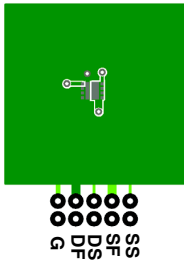
DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|----------|------------------------------------|--|----|--|------|-----|----|
| V_{SD} | Source-Drain Diode Forward Voltage | $V_{GS} = 0\text{ V}, I_S = 10\text{ A}$ (Note 2) $V_{GS} = 0\text{ V}, I_S = 1.5\text{ A}$ (Note 2) $V_{GS} = 0\text{ V}, I_S = 16\text{ A}$ (Note 2) $V_{GS} = 0\text{ V}, I_S = 2\text{ A}$ (Note 2) | Q1 | | 0.85 | 1.2 | V |
| | | | Q1 | | 0.75 | 1.2 | |
| | | | Q2 | | 0.83 | 1.2 | |
| | | | Q2 | | 0.73 | 1.2 | |
| t_{rr} | Reverse Recovery Time | Q1 $I_F = 10\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | Q1 | | 17 | 31 | ns |
| | | | Q2 | | 27 | 42 | |
| Q_{rr} | Reverse Recovery Charge | Q2 $I_F = 16\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | Q1 | | 5 | 10 | nC |
| | | | Q2 | | 10 | 20 | |

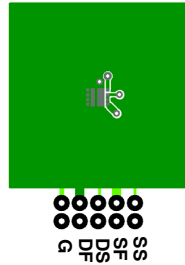
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

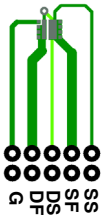
- $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR-4 material. $R_{\theta CA}$ is determined by the user's board design.



a. 65 °C/W when mounted on a 1 in² pad of 2 oz copper.



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



c. 180 °C/W when mounted on a minimum pad of 2 oz copper.



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

- Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.
- Q1: E_{AS} of 24 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 3\text{ mH}$, $I_{AS} = 4\text{ A}$, $V_{DD} = 30\text{ V}$, $V_{GS} = 10\text{ V}$. 100% tested at $L = 0.1\text{ mH}$, $I_{AS} = 13\text{ A}$.
Q2: E_{AS} of 54 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 3\text{ mH}$, $I_{AS} = 6\text{ A}$, $V_{DD} = 30\text{ V}$, $V_{GS} = 10\text{ V}$. 100% tested at $L = 0.1\text{ mH}$, $I_{AS} = 22\text{ A}$.
- As an N-ch device, the negative V_{GS} rating is for low duty cycle pulse occurrence only. No continuous rating is implied.
- Pulsed I_D please refer to Figure 11 and Figure. 24 SOA graph for more details.
- Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

TYPICAL CHARACTERISTICS (Q1 N-CHANNEL)

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

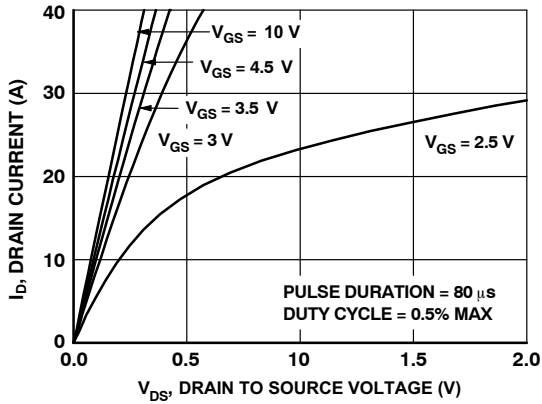


Figure 1. On Region Characteristics

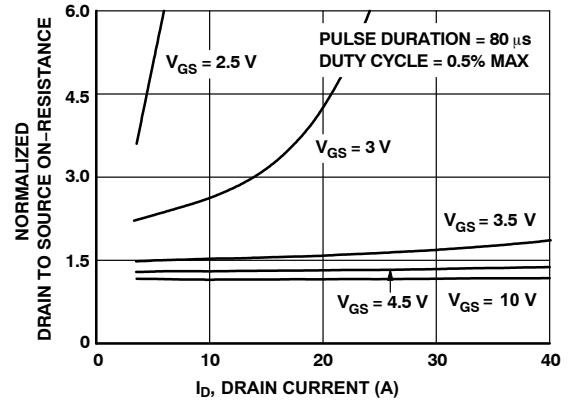


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

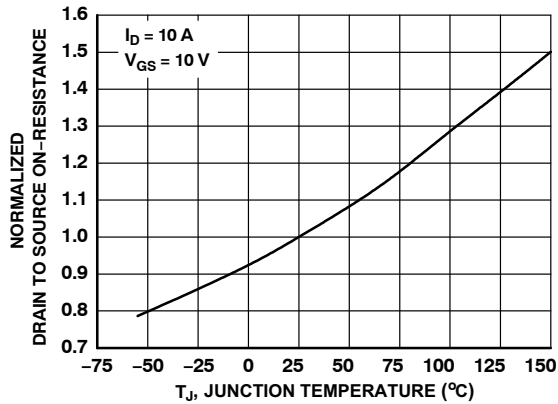


Figure 3. Normalized On Resistance vs. Junction Temperature

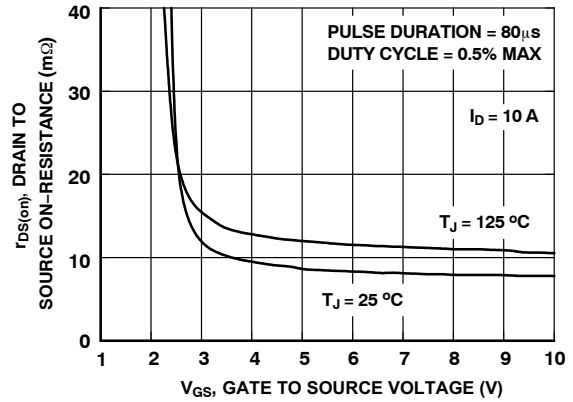


Figure 4. On-Resistance vs. Gate to Source Voltage

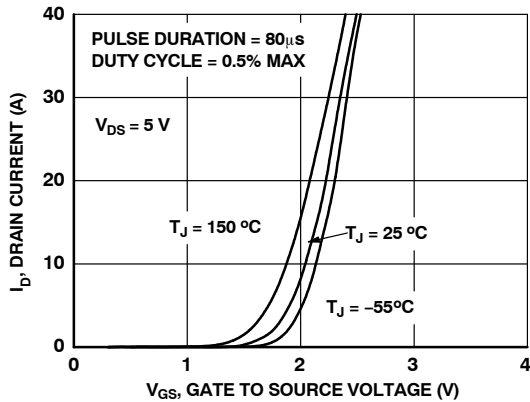


Figure 5. Transfer Characteristics

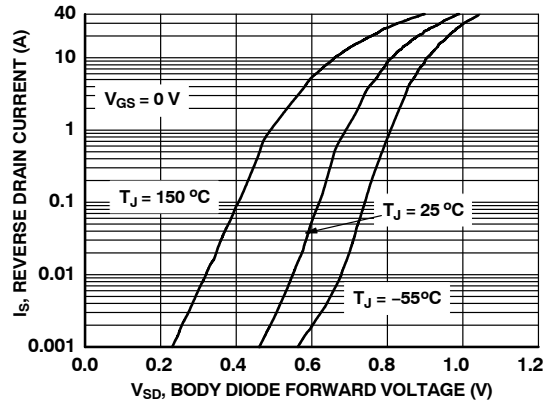


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (Q1 N-CHANNEL) (CONTINUED)

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

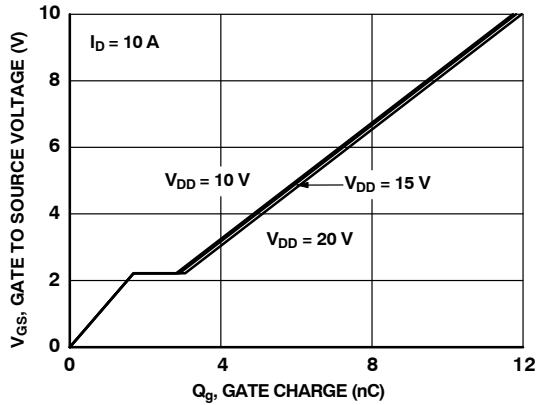


Figure 7. Gate Charge Characteristics

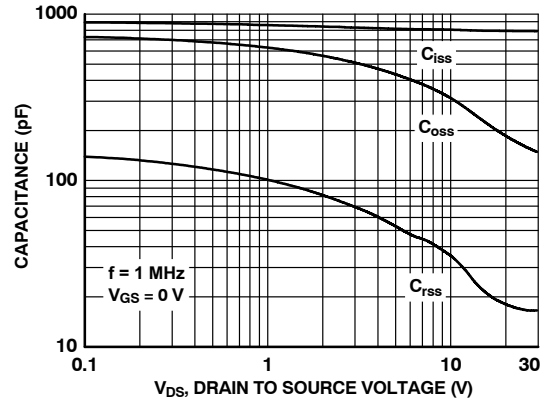


Figure 8. Capacitance vs. Drain to Source Voltage

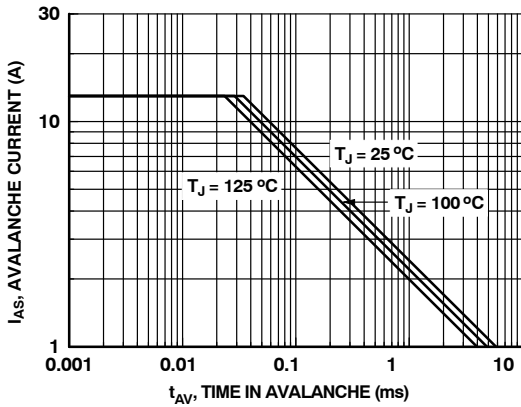


Figure 9. Unclamped Inductive Switching Capability

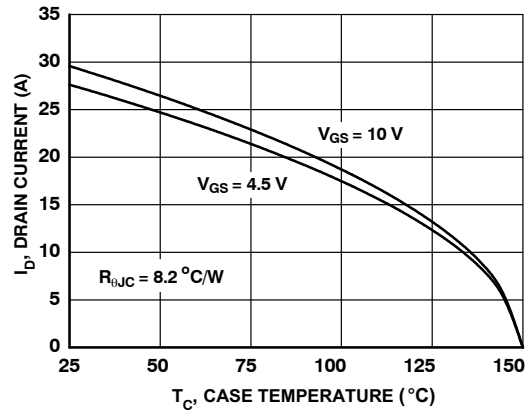


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

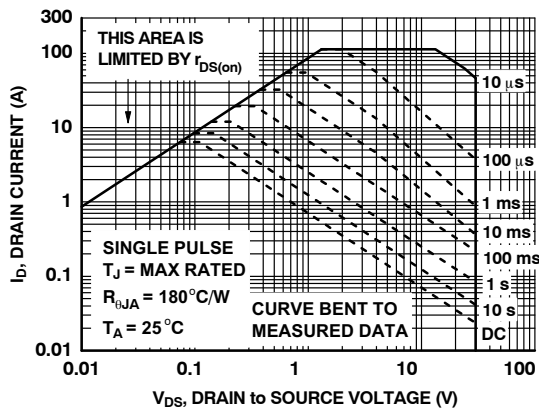


Figure 11. Forward Bias Safe Operating Area

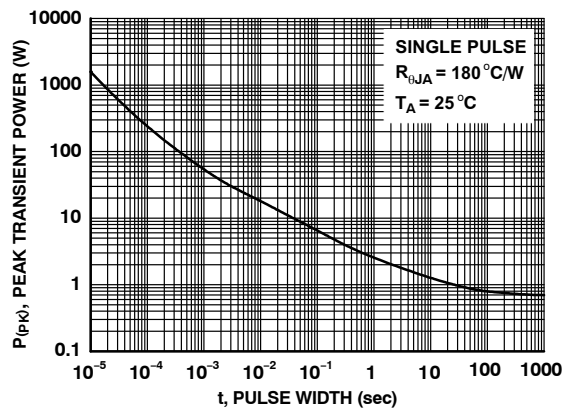


Figure 12. Single Pulse Maximum Power Dissipation

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TYPICAL CHARACTERISTICS (Q1 N-CHANNEL) (CONTINUED)

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

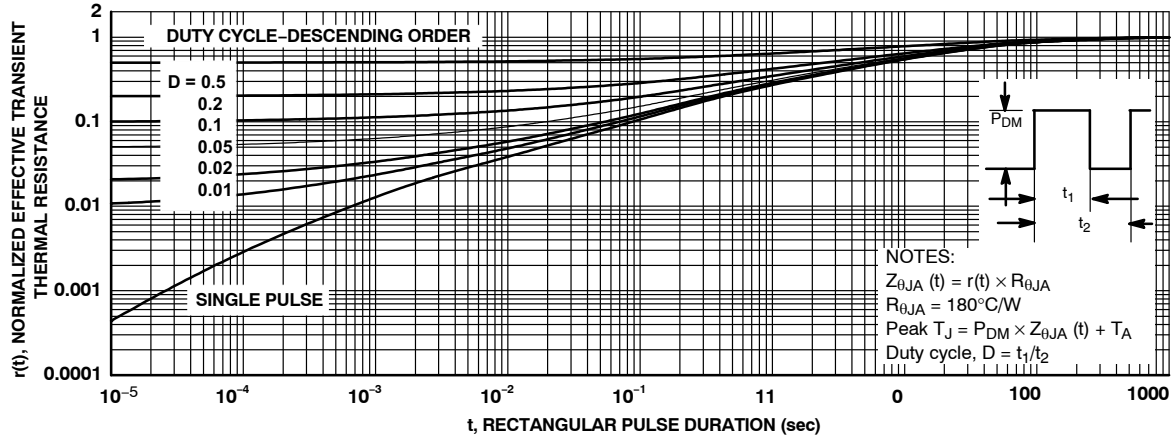


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

TYPICAL CHARACTERISTICS (Q2 N-CHANNEL)

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

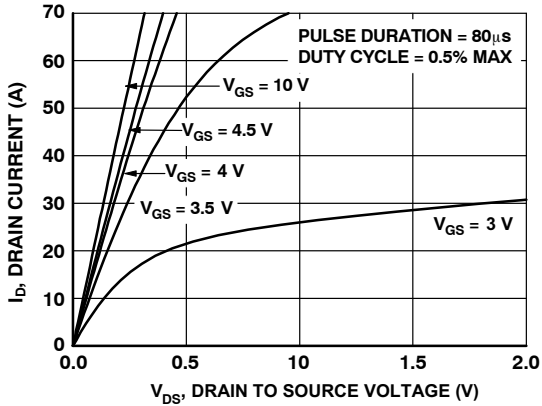


Figure 14. On Region Characteristics

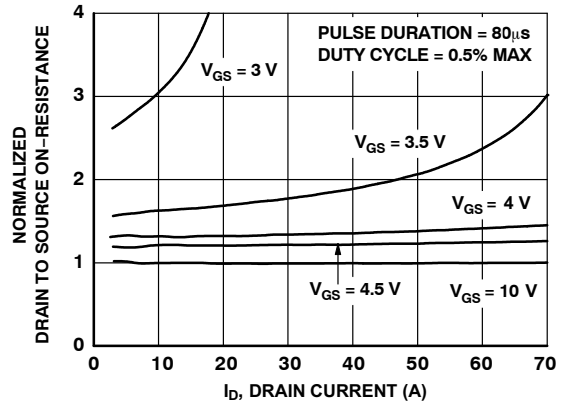


Figure 15. Normalized On-Resistance vs. Drain Current and Gate Voltage

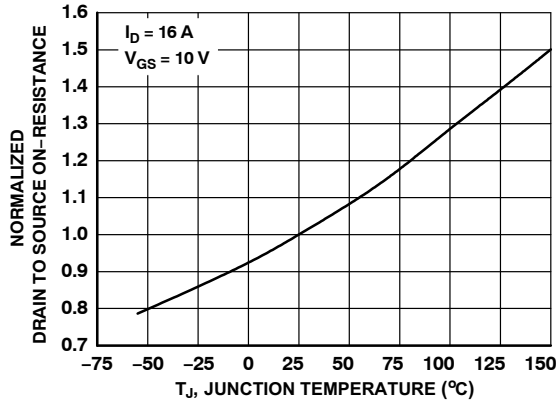


Figure 16. Normalized On Resistance vs. Junction Temperature

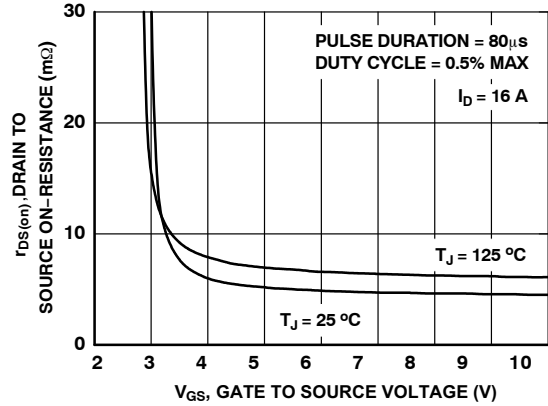


Figure 17. On-Resistance vs. Gate to Source Voltage

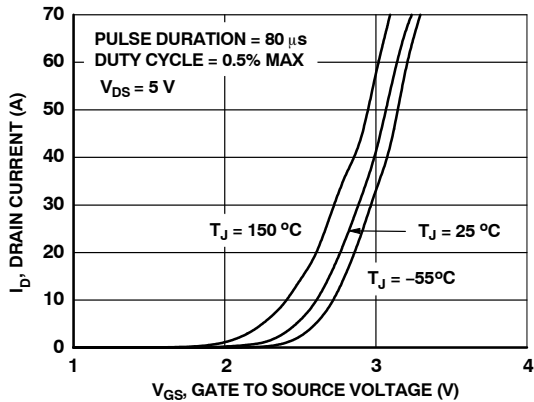


Figure 18. Transfer Characteristics

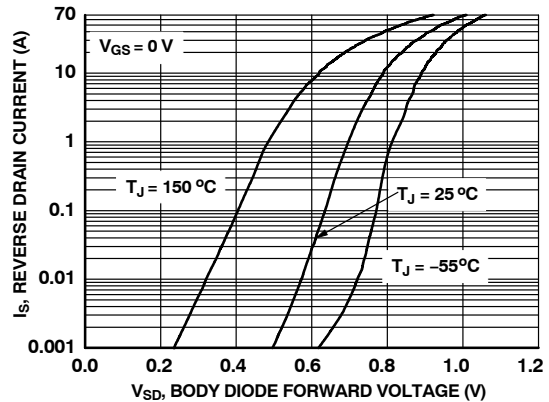


Figure 19. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (Q2 N-CHANNEL) (CONTINUED)

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

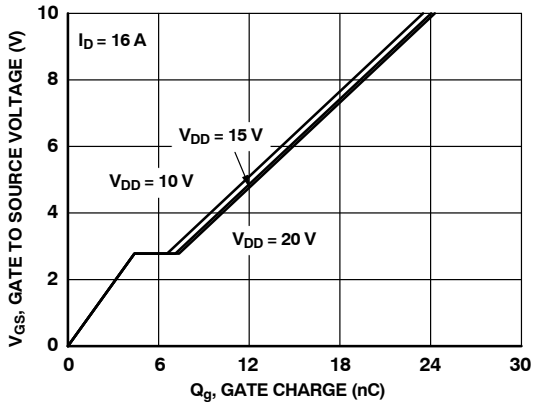


Figure 20. Gate Charge Characteristics

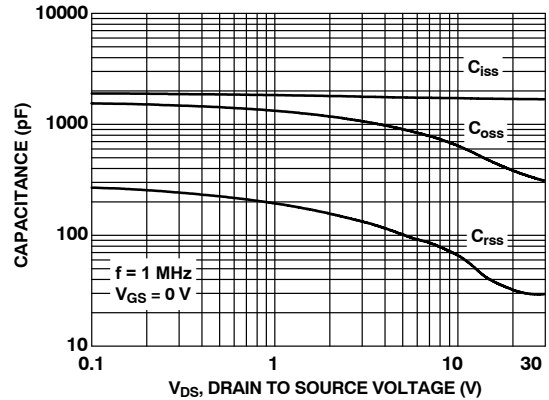


Figure 21. Capacitance vs. Drain to Source Voltage

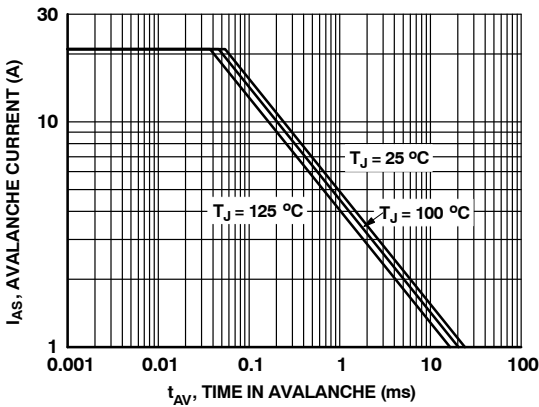


Figure 22. Unclamped Inductive Switching Capability

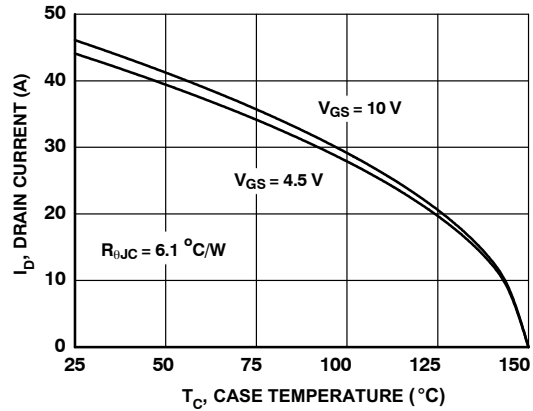


Figure 23. Maximum Continuous Drain Current vs. Case Temperature

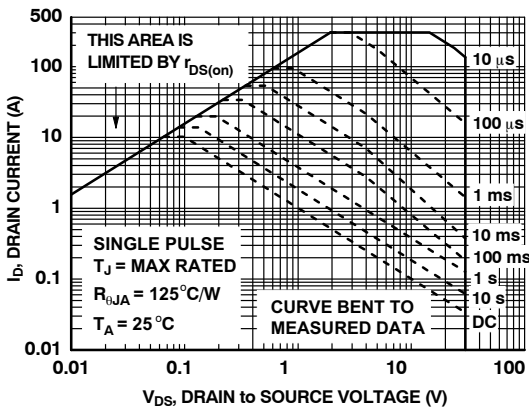


Figure 24. Forward Bias Safe Operating Area

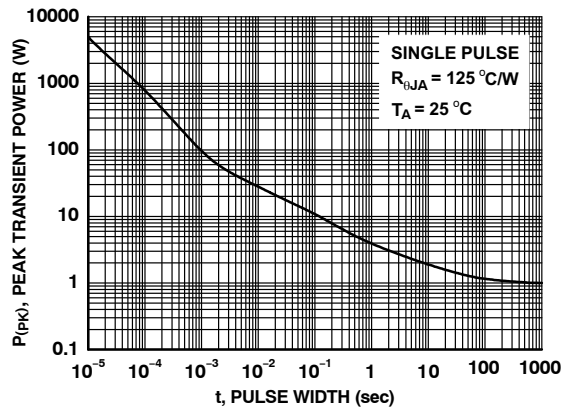


Figure 25. Single Pulse Maximum Power Dissipation

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TYPICAL CHARACTERISTICS (Q2 N-CHANNEL) (CONTINUED)

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

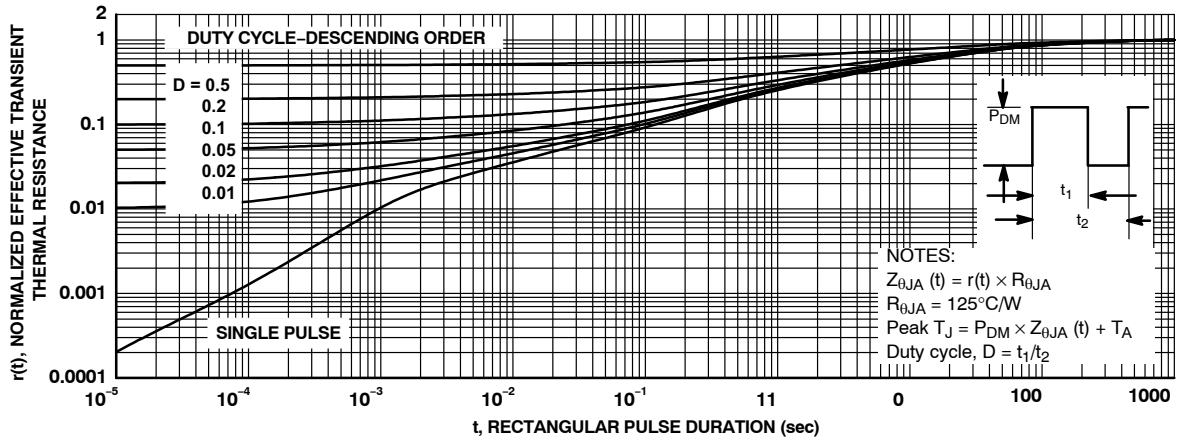


Figure 26. Junction-to-Ambient Transient Thermal Response Curve

MECHANICAL CASE OUTLINE

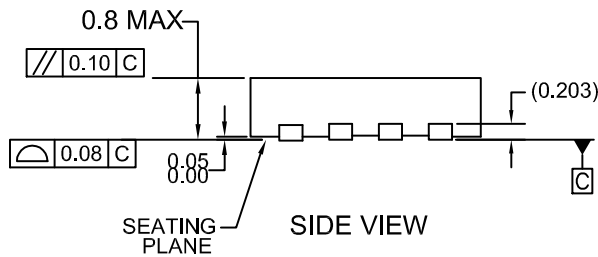
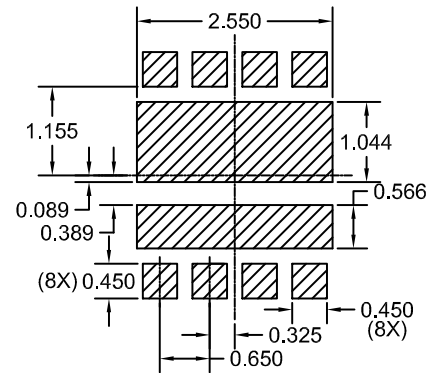
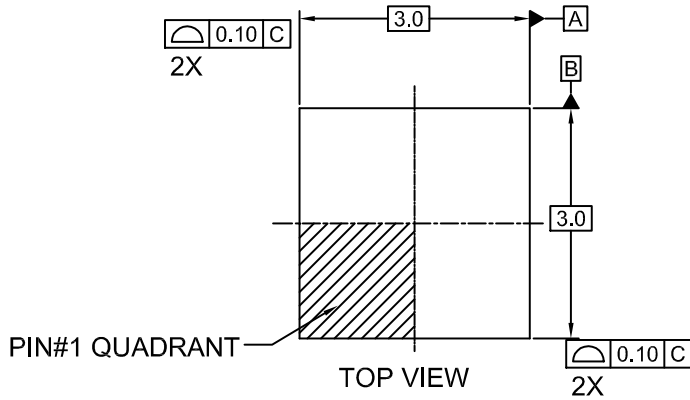
PACKAGE DIMENSIONS

ON Semiconductor®

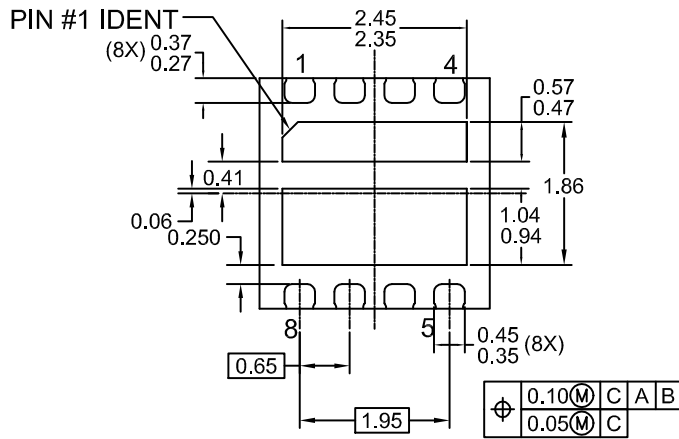


WDFN8 3x3, 0.65P
CASE 511DE
ISSUE O

DATE 31 AUG 2016



RECOMMENDED LAND PATTERN



BOTTOM VIEW

NOTES:

- A. DOES NOT CONFORM TO JEDEC REGISTRATION MO-229
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

| | | |
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