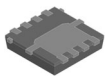
# MOSFET – Power, Single N-Channel, μ8FL

## 30 V, 55 A, 5.9 mΩ

# NVTFS4C08N

| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX | $I_D$ MAX |
|---|---|---|
| 30 V | 5.9 mΩ @ 10 V | 55 A |
| | 9.0 mΩ @ 4.5 V | |

**WDFN8**
**CASE 511AB**



**WDFNW8**
**CASE 515AN**

### Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- NVTFS4C08NWF – Wettable Flanks Product
- NVT Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS ($T_J$ = 25°C unless otherwise stated)

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{DSS}$ | Drain−to−Source Voltage | | | 30 | V |
| $V_{GS}$ | Gate−to−Source Voltage | | | ±20 | V |
| $I_D$ | Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 4) | Steady State | $T_A$ = 25°C | 17 | A |
| | | | $T_A$ = 100°C | 12 | |
| $P_D$ | Power Dissipation $R_{\theta JA}$ (Note 1, 2, 4) | | $T_A$ = 25°C | 3.1 | W |
| | | | $T_A$ = 100°C | 1.6 | |
| $I_D$ | Continuous Drain Current $R_{\theta JC}$ (Note 1, 3, 4) | | $T_A$ = 25°C | 55 | |
| | | | $T_A$ = 100°C | 39 | A |
| $P_D$ | Power Dissipation $R_{\theta JC}$ (Note 1, 3, 4) | | $T_A$ = 25°C | 31 | W |
| | | | $T_A$ = 100°C | 15 | |
| $I_{DM}$ | Pulsed Drain Current | $T_A$ = 25°C, $t_p$ = 10 μs | | 253 | A |
| $T_J$, $T_{stg}$ | Operating Junction and Storage Temperature | | | −55 to +175 | °C |
| $I_S$ | Source Current (Body Diode) | | | 28 | A |
| $E_{AS}$ | Single Pulse Drain−to−Source Avalanche Energy ($T_J$ = 25°C, $I_L$ = 20 $A_{pk}$, L = 0.1 mH) | | | 20 | mJ |
| $T_L$ | Lead Temperature for Soldering Purposes (1/8″ from case for 10 s) | | | 260 | °C |

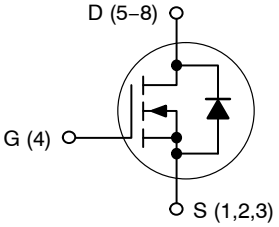
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL RESISTANCE MAXIMUM RATINGS

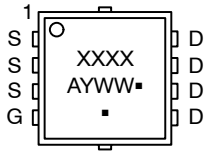
| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Junction−to−Case − Steady State (Drain) (Notes 1 and 4) | 4.9 | °C/W |
| $R_{\theta JA}$ | Junction−to−Ambient − Steady State (Notes 1 and 2) | 48 | |

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface−mounted on FR4 board using a 650 $mm^2$ 2 oz. Cu pad.
3. Assumes heat−sink sufficiently large to maintain constant case temperature independent of device power.
4. Continuous DC current rating. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

**N−Channel MOSFET**




### MARKING DIAGRAM




| | |
|---|---|
| 4C08 | = Specific Device Code for NVMTS4C08N |
| 08WF | = Specific Device Code of NVTFS4C08NWF |
| A | = Assembly Location |
| Y | = Year |
| WW | = Work Week |
| ▪ | = Pb−Free Package |

(Note: Microdot may be in either location)

### ORDERING INFORMATION

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

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 5.

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| $V_{(BR)DSS}$ | Drain−to−Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 μA | | 30 | | | V |
| $V_{(BR)DSS}/T_J$ | Drain−to−Source Breakdown Voltage Temperature Coefficient | | | | 13.8 | | mV/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$ = 0 V, $V_{DS}$ = 24 V | $T_J$ = 25°C | | | 1.0 | μA |
| | | | $T_J$ = 125°C | | | 10 | |
| $I_{GSS}$ | Gate−to−Source Leakage Current | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | | ±100 | nA |
| **ON CHARACTERISTICS** (Note 5) | | | | | | | |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250 μA | | 1.3 | | 2.2 | V |
| $V_{GS(TH)}/T_J$ | Negative Threshold Temperature Coefficient | | | | 5.0 | | mV/°C |
| $R_{DS(on)}$ | Drain−to−Source On Resistance | $V_{GS}$ = 10 V | $I_D$ = 30 A | | 4.7 | 5.9 | mΩ |
| | | $V_{GS}$ = 4.5 V | $I_D$ = 18 A | | 7.2 | 9.0 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 1.5 V, $I_D$ = 15 A | | | 42 | | S |
| $R_G$ | Gate Resistance | $T_A$ = 25°C | | | 1.0 | | Ω |
| **CHARGES AND CAPACITANCES** | | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{GS}$ = 0 V, f = 1 MHz, $V_{DS}$ = 15 V | | | 1113 | | pF |
| $C_{OSS}$ | Output Capacitance | | | | 702 | | |
| $C_{RSS}$ | Reverse Transfer Capacitance | | | | 39 | | |
| $C_{RSS}/C_{ISS}$ | Capacitance Ratio | $V_{GS}$ = 0 V, $V_{DS}$ = 15 V, f = 1 MHz | | | 0.035 | | |
| $Q_{G(TOT)}$ | Total Gate Charge | $V_{GS}$ = 4.5 V, $V_{DS}$ = 15 V; $I_D$ = 30 A | | | 8.4 | | nC |
| $Q_{G(TH)}$ | Threshold Gate Charge | | | | 1.8 | | |
| $Q_{GS}$ | Gate−to−Source Charge | | | | 3.5 | | |
| $Q_{GD}$ | Gate−to−Drain Charge | | | | 3.3 | | |
| $V_{GP}$ | Gate Plateau Voltage | | | | 3.4 | | V |
| $Q_{G(TOT)}$ | Total Gate Charge | $V_{GS}$ = 10 V, $V_{DS}$ = 15 V; $I_D$ = 30 A | | | 18.2 | | nC |
| **SWITCHING CHARACTERISTICS** (Note 6) | | | | | | | |
| $t_{d(ON)}$ | Turn−On Delay Time | $V_{GS}$ = 4.5 V, $V_{DS}$ = 15 V, $I_D$ = 15 A, $R_G$ = 3.0 Ω | | | 9.0 | | ns |
| $t_r$ | Rise Time | | | | 33 | | |
| $t_{d(OFF)}$ | Turn−Off Delay Time | | | | 15 | | |
| $t_f$ | Fall Time | | | | 4.0 | | |
| $t_{d(ON)}$ | Turn−On Delay Time | $V_{GS}$ = 10 V, $V_{DS}$ = 15 V, $I_D$ = 15 A, $R_G$ = 3.0 Ω | | | 7.0 | | ns |
| $t_r$ | Rise Time | | | | 26 | | |
| $t_{d(OFF)}$ | Turn−Off Delay Time | | | | 19 | | |
| $t_f$ | Fall Time | | | | 3.0 | | |
| **DRAIN−SOURCE DIODE CHARACTERISTICS** | | | | | | | |
| $V_{SD}$ | Forward Diode Voltage | $V_{GS}$ = 0 V, $I_S$ = 10 A | $T_J$ = 25°C | | 0.79 | 1.1 | V |
| | | | $T_J$ = 125°C | | 0.66 | | |
| $t_{RR}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, dIS/dt = 100 A/μs, $I_S$ = 30 A | | | 28.3 | | ns |
| $t_a$ | Charge Time | | | | 14.5 | | |
| $t_b$ | Discharge Time | | | | 13.8 | | |
| $Q_{RR}$ | Reverse Recovery Charge | | | | 15.3 | | 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.

5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.

## TYPICAL CHARACTERISTICS

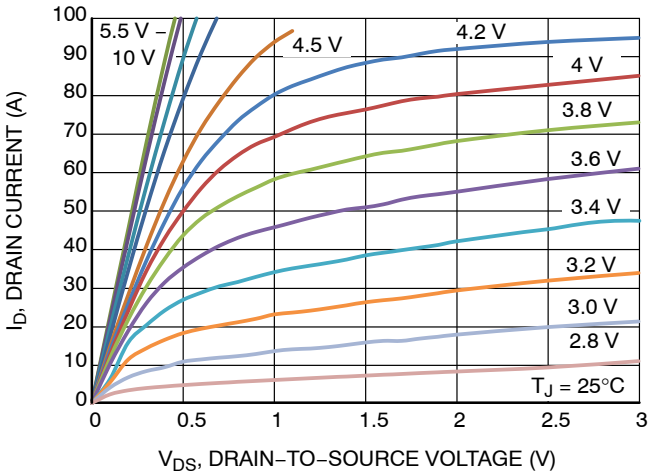



**Figure 1. On–Region Characteristics**

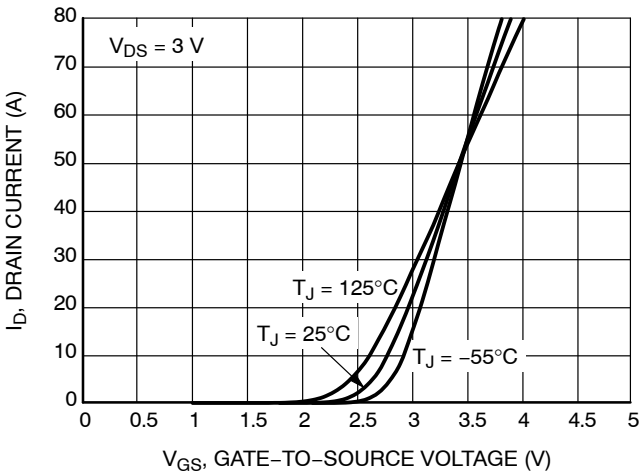



**Figure 2. Transfer Characteristics**

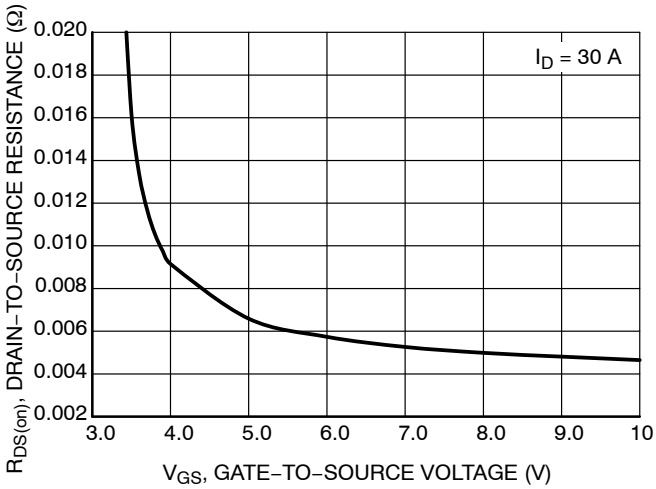



**Figure 3. On–Resistance vs. $V_{GS}$**

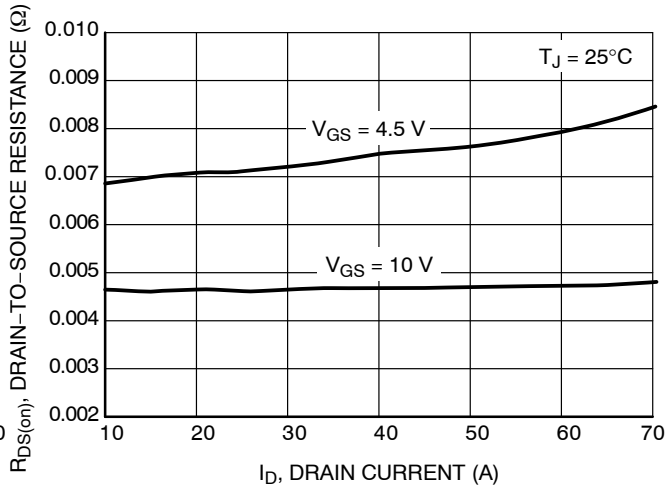



**Figure 4. On–Resistance vs. Drain Current and Gate Voltage**

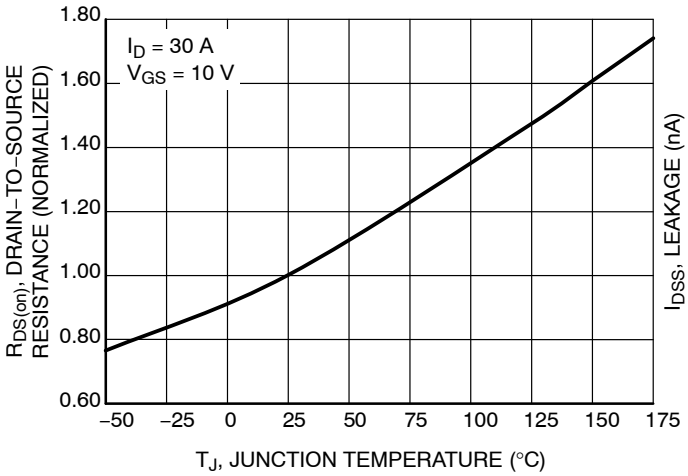



**Figure 5. On–Resistance Variation with Temperature**

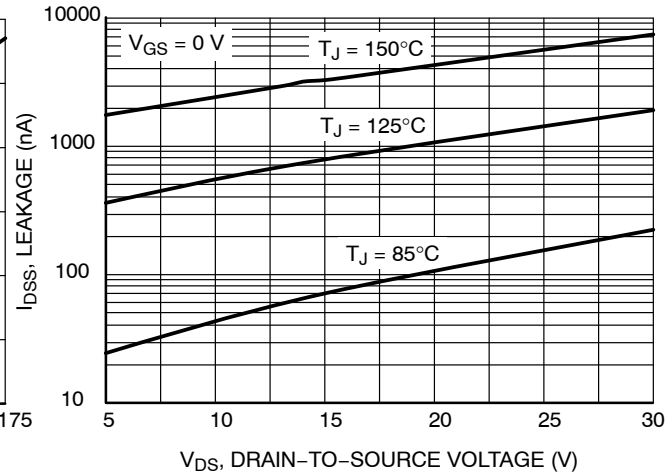



**Figure 6. Drain–to–Source Leakage Current vs. Voltage**

## TYPICAL CHARACTERISTICS (continued)

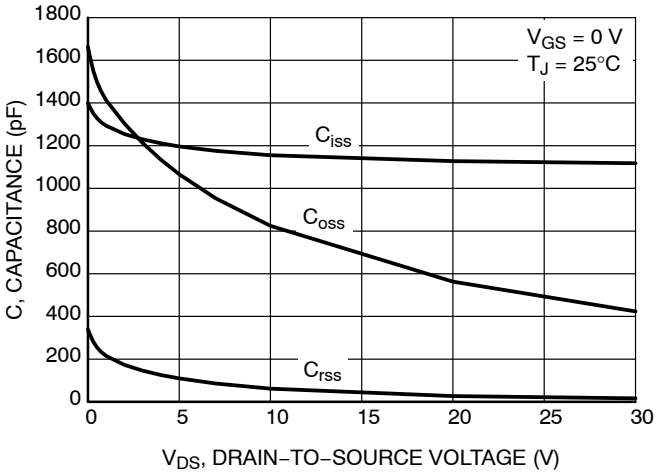



**Figure 7. Capacitance Variation**

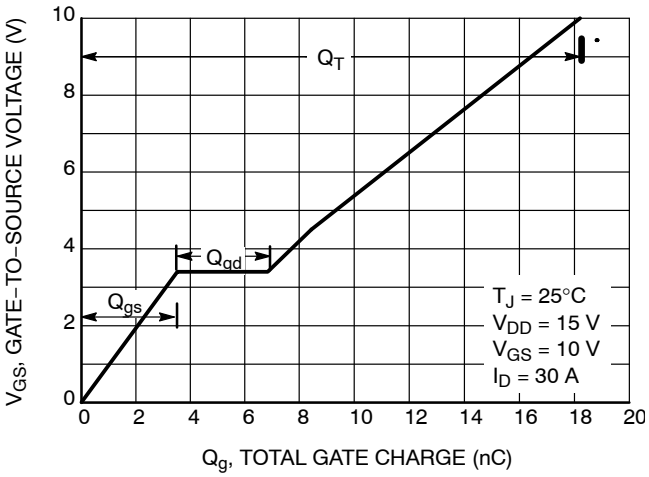



**Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge**

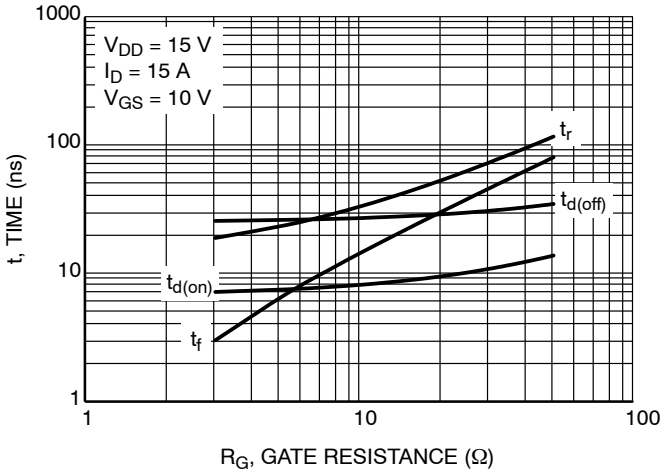



**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**

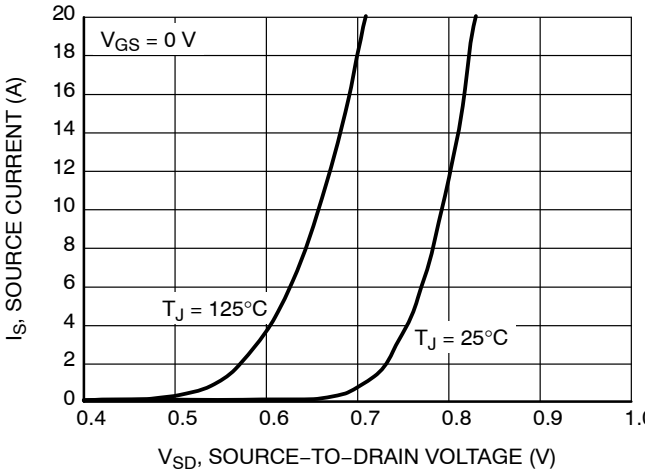



**Figure 10. Diode Forward Voltage vs. Current**

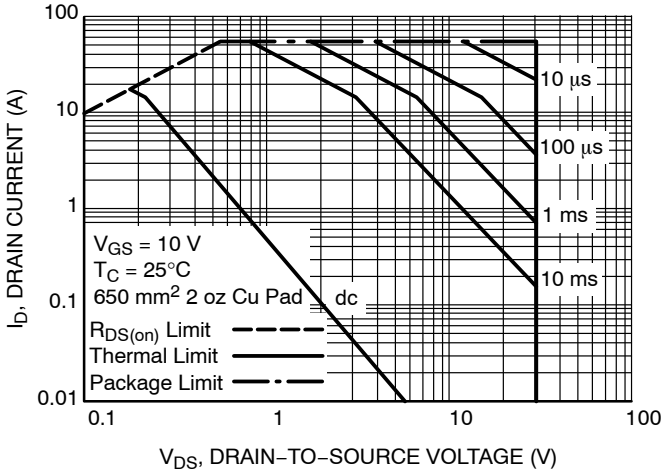



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**

## TYPICAL CHARACTERISTICS (continued)

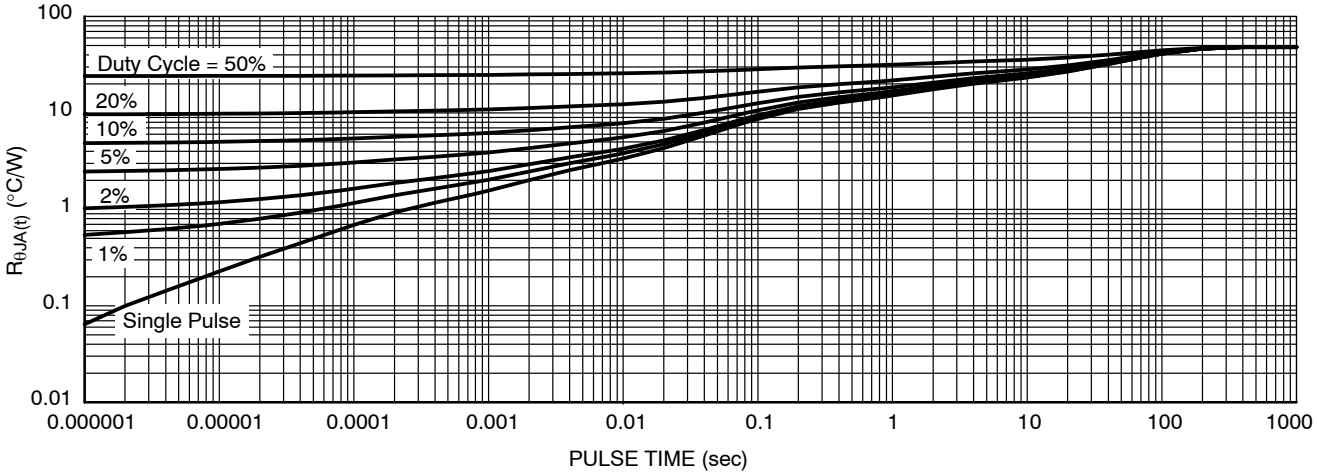



**Figure 12. Thermal Response**

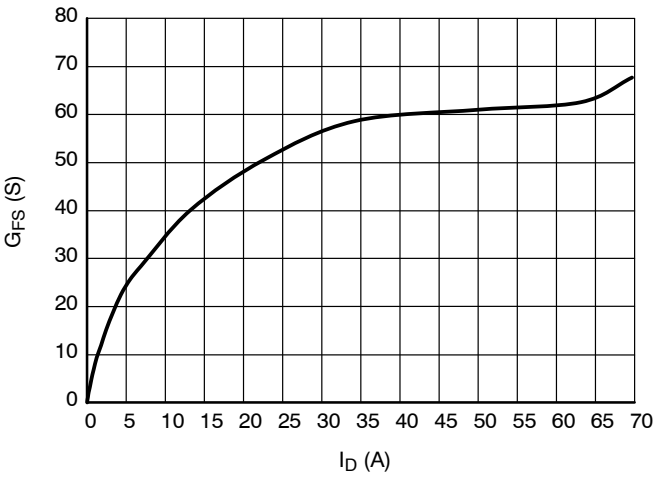



**Figure 13. $G_{FS}$ vs. $I_D$**

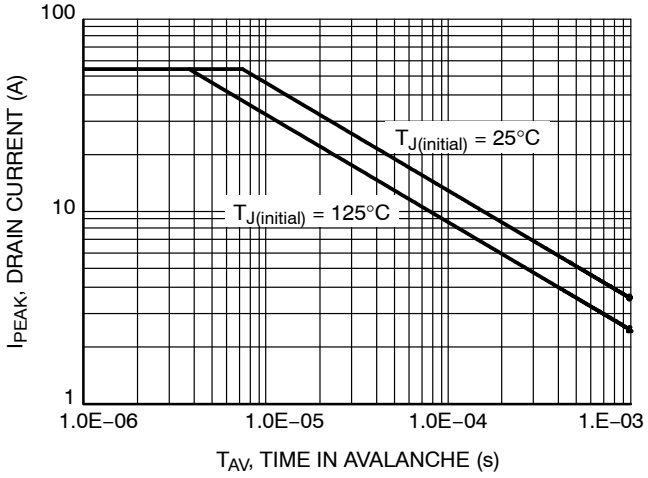



**Figure 14. Avalanche Characteristics**

## ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NVTFS4C08NTAG | WDFN8<br>(Pb−Free) | 1500 / Tape & Reel |
| NVTFS4C08NTWG | WDFN8<br>(Pb−Free) | 5000 / Tape & Reel |

**DISCONTINUED** (Note 7)

| | | |
|---|---|---|
| NVTFS4C08NWFTAG | WDFNW8<br>(Pb−Free) | 1500 / Tape & Reel |
| NVTFS4C08NWFTWG | WDFNW8<br>(Pb−Free) | 5000 / Tape & Reel |

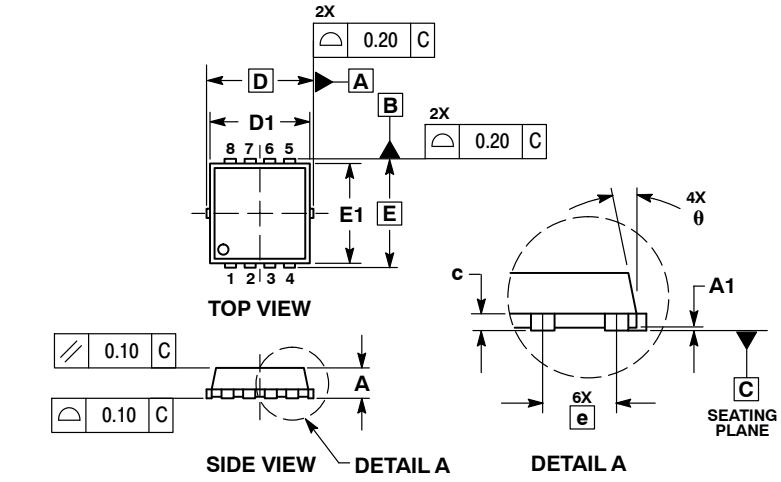
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

7. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

**SCALE 2:1**

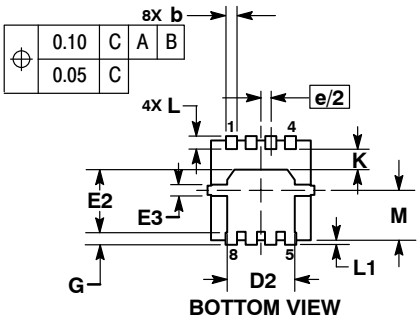
**WDFN8 3.3x3.3, 0.65P**
CASE 511AB
ISSUE D

DATE 23 APR 2012




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.031 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.23 | 0.30 | 0.40 | 0.009 | 0.012 | 0.016 |
| c | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| D | 3.30 BSC | | | 0.130 BSC | | |
| D1 | 2.95 | 3.05 | 3.15 | 0.116 | 0.120 | 0.124 |
| D2 | 1.98 | 2.11 | 2.24 | 0.078 | 0.083 | 0.088 |
| E | 3.30 BSC | | | 0.130 BSC | | |
| E1 | 2.95 | 3.05 | 3.15 | 0.116 | 0.120 | 0.124 |
| E2 | 1.47 | 1.60 | 1.73 | 0.058 | 0.063 | 0.068 |
| E3 | 0.23 | 0.30 | 0.40 | 0.009 | 0.012 | 0.016 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| G | 0.30 | 0.41 | 0.51 | 0.012 | 0.016 | 0.020 |
| K | 0.65 | 0.80 | 0.95 | 0.026 | 0.032 | 0.037 |
| L | 0.30 | 0.43 | 0.56 | 0.012 | 0.017 | 0.022 |
| L1 | 0.06 | 0.13 | 0.20 | 0.002 | 0.005 | 0.008 |
| M | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| θ | 0 ° | --- | 12 ° | 0 ° | --- | 12 ° |

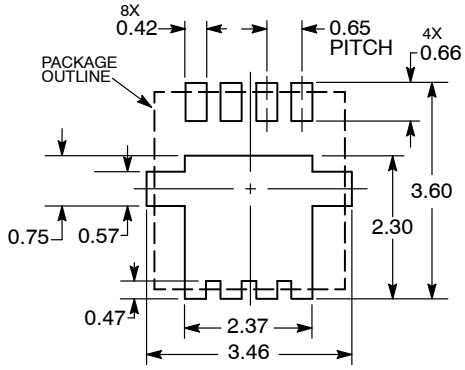



## GENERIC MARKING DIAGRAM*


XXXXX = 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.

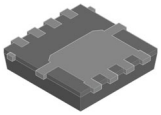
## SOLDERING FOOTPRINT*




DIMENSION: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

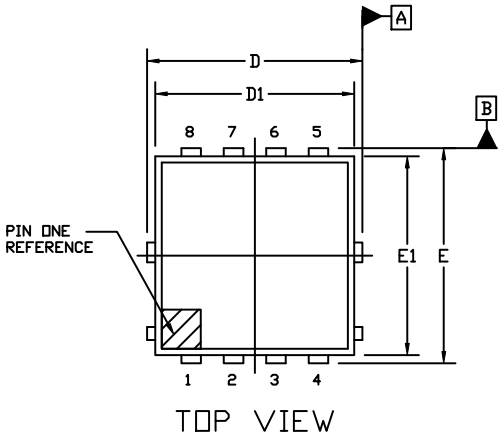
| | | |
|---|---|---|
| **DOCUMENT NUMBER:** | **98AON30561E** | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| **DESCRIPTION:** | **WDFN8 3.3X3.3, 0.65P** | **PAGE 1 OF 1** |



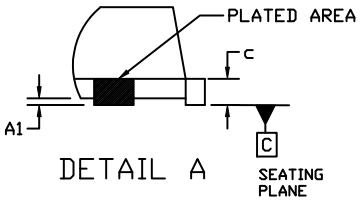
## WDFNW8 3.3x3.3, 0.65P (Full−Cut μ8FL WF)

CASE 515AN
ISSUE O

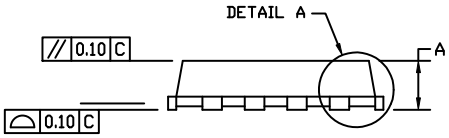
DATE 25 AUG 2020



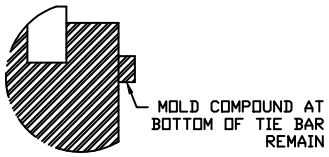

TOP VIEW




DETAIL A




SIDE VIEW

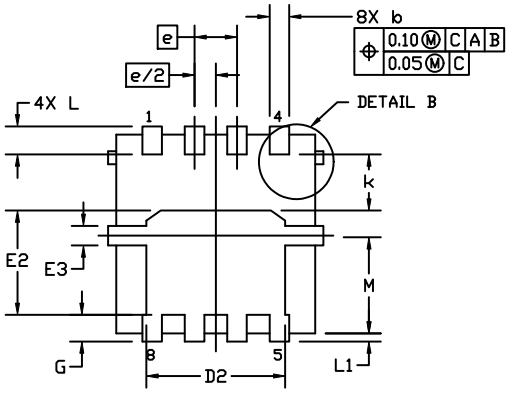



DETAIL B

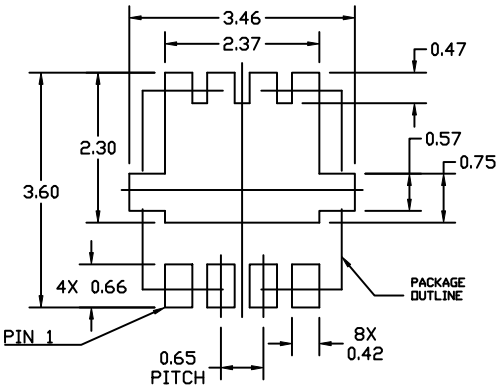
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN. | NOM. | MAX. |
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | ---- | 0.05 |
| b | 0.23 | 0.30 | 0.40 |
| c | 0.15 | 0.20 | 0.25 |
| D | 3.05 | 3.30 | 3.55 |
| D1 | 2.95 | 3.05 | 3.15 |
| D2 | 1.98 | 2.11 | 2.24 |
| E | 3.05 | 3.30 | 3.55 |
| E1 | 2.95 | 3.05 | 3.15 |
| E2 | 1.47 | 1.60 | 1.73 |
| E3 | 0.23 | 0.30 | 0.40 |
| e | 0.65 BSC | | |
| G | 0.30 | 0.41 | 0.51 |
| K | 0.65 | 0.80 | 0.95 |
| L | 0.30 | 0.43 | 0.59 |
| L1 | 0.06 | 0.13 | 0.20 |
| M | 1.40 | 1.50 | 1.60 |



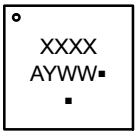

BOTTOM VIEW




RECOMMENDED MOUNTING FOOTPRINT

* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

### GENERIC MARKING DIAGRAM*




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

(Note: Microdot may be in either location)

*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.

| | | | |
|---|---|---|---|
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| **DESCRIPTION:** | **WDFNW8 3.3x3.3, 0.65P (Full−Cut μ8FL WF)** | | **PAGE 1 OF 1** |

## ADDITIONAL INFORMATION

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