

MOSFET – Power, Single, N-Channel, μ 8FL

30 V, 71 A, 4.2 m Ω

NVTFS4C06N

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- NVTFS4C06NWF – 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 ($T_J = 25^\circ\text{C}$ 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 $T_A = 25^\circ\text{C}$: 21 $T_A = 100^\circ\text{C}$: 15 | A |
| P_D | Power Dissipation $R_{\theta JA}$ (Note 1, 2, 4) | $T_A = 25^\circ\text{C}$: 3.1 $T_A = 100^\circ\text{C}$: 1.6 | W |
| I_D | Continuous Drain Current $R_{\theta JC}$ (Note 1, 3, 4) | $T_A = 25^\circ\text{C}$: 71 $T_A = 100^\circ\text{C}$: 50 | A |
| P_D | Power Dissipation $R_{\theta JC}$ (Note 1, 3, 4) | $T_A = 25^\circ\text{C}$: 37 $T_A = 100^\circ\text{C}$: 18 | W |
| I_{DM} | Pulsed Drain Current | $T_A = 25^\circ\text{C}$, $t_p = 10 \mu\text{s}$: 367 | A |
| T_J , T_{stg} | Operating Junction and Storage Temperature | -55 to +175 | $^\circ\text{C}$ |
| I_S | Source Current (Body Diode) | 33 | A |
| E_{AS} | Single Pulse Drain-to-Source Avalanche Energy ($T_J = 25^\circ\text{C}$, $I_L = 26 A_{pk}$, $L = 0.1 \text{ mH}$) | 34 | mJ |
| T_L | Lead Temperature for Soldering Purposes (1/8" from Case for 10 s) | 260 | $^\circ\text{C}$ |

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.

| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX | I_D MAX |
|---------------|------------------------|-----------|
| 30 V | 4.2 m Ω @ 10 V | 71 A |
| | 6.1 m Ω @ 4.5 V | |

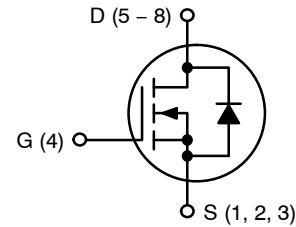


WDFN8 3.3x3.3, 0.65P
CASE 511AB

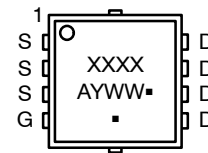


WDFNW8 3.3x3.3, 0.65P (Full-Cut μ 8FL WF)
CASE 515AN

N-Channel



MARKING DIAGRAM



- 4C06 = Specific Device Code for NVMTS4C06N
06WF = Specific Device Code of NVTFS4C06NWF
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

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

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 6.

THERMAL RESISTANCE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------------|---|-------|------|
| $R_{\theta JC}$ | Junction-to-Case – Steady State (Drain) (Notes 1 and 4) | 4.1 | °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 mm² 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.

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ 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 | | | – | 14.4 | – | 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 | $V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$ | 1.3 | – | 2.2 | V |
| $V_{GS(TH)}/T_J$ | Negative Threshold Temperature Coefficient | | – | 3.8 | – | mV/°C |
| $R_{DS(on)}$ | Drain-to-Source On Resistance | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}$ | – | 3.4 | 4.2 | $\text{m}\Omega$ |
| | | $V_{GS} = 4.5\text{ V}, I_D = 30\text{ A}$ | – | 4.9 | 6.1 | |
| g_{FS} | Forward Transconductance | $V_{DS} = 1.5\text{ V}, I_D = 15\text{ A}$ | – | 58 | – | S |
| R_G | Gate Resistance | $T_A = 25^\circ\text{C}$ | – | 1.0 | – | Ω |

CHARGES AND CAPACITANCES

| | | | | | | |
|-------------------|------------------------------|--|---|-------|---|----|
| C_{ISS} | Input Capacitance | $V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 15\text{ V}$ | – | 1683 | – | pF |
| C_{OSS} | Output Capacitance | | – | 841 | – | |
| C_{RSS} | Reverse Transfer Capacitance | | – | 40 | – | |
| C_{RSS}/C_{ISS} | Capacitance Ratio | $V_{GS} = 0\text{ V}, V_{DS} = 15\text{ V}, f = 1\text{ MHz}$ | – | 0.023 | – | |
| $Q_{G(TOT)}$ | Total Gate Charge | $V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}; I_D = 30\text{ A}$ | – | 11.6 | – | nC |
| $Q_{G(TH)}$ | Threshold Gate Charge | | – | 2.6 | – | |
| Q_{GS} | Gate-to-Source Charge | | – | 4.7 | – | |
| Q_{GD} | Gate-to-Drain Charge | | – | 4.0 | – | |
| V_{GP} | Gate Plateau Voltage | | – | 3.1 | – | |
| $Q_{G(TOT)}$ | Total Gate Charge | $V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}; I_D = 30\text{ A}$ | – | 26 | – | nC |

SWITCHING CHARACTERISTICS (Note 6)

| | | | | | | |
|--------------|---------------------|---|---|-----|---|----|
| $t_{d(ON)}$ | Turn-On Delay Time | $V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 15\text{ A}, R_G = 3.0\text{ }\Omega$ | – | 10 | – | ns |
| t_r | Rise Time | | – | 32 | – | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | – | 18 | – | |
| t_f | Fall Time | | – | 5.0 | – | |
| $t_{d(ON)}$ | Turn-On Delay Time | $V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}, I_D = 15\text{ A}, R_G = 3.0\text{ }\Omega$ | – | 8.0 | – | ns |
| t_r | Rise Time | | – | 28 | – | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | – | 24 | – | |
| t_f | Fall Time | | – | 3.0 | – | |

NVTFS4C06N

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

| Symbol | Parameter | Test Condition | | Min | Typ | Max | Unit |
|------------------------------------|-------------------------|---|------------------------|-----|------|-----|------|
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | | |
| V _{SD} | Forward Diode Voltage | V _{GS} = 0 V, I _S = 10 A | T _J = 25°C | – | 0.8 | 1.1 | V |
| | | | T _J = 125°C | – | 0.63 | – | |
| t _{RR} | Reverse Recovery Time | V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 30 A | | – | 34 | – | ns |
| t _a | Charge Time | | | – | 17 | – | |
| t _b | Discharge Time | | | – | 17 | – | |
| Q _{RR} | Reverse Recovery Charge | | | – | 22 | – | 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 $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

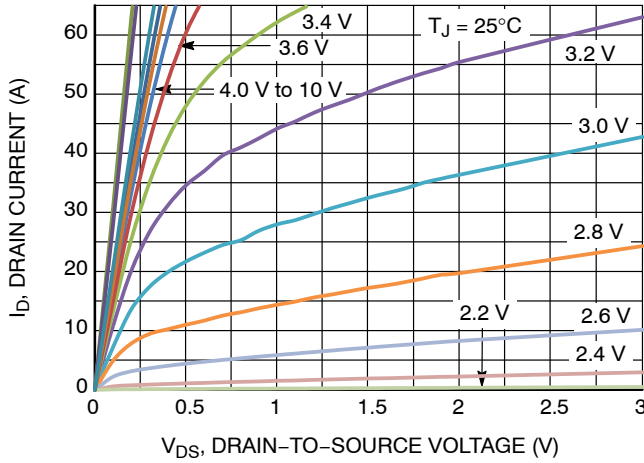


Figure 1. On-Region Characteristics

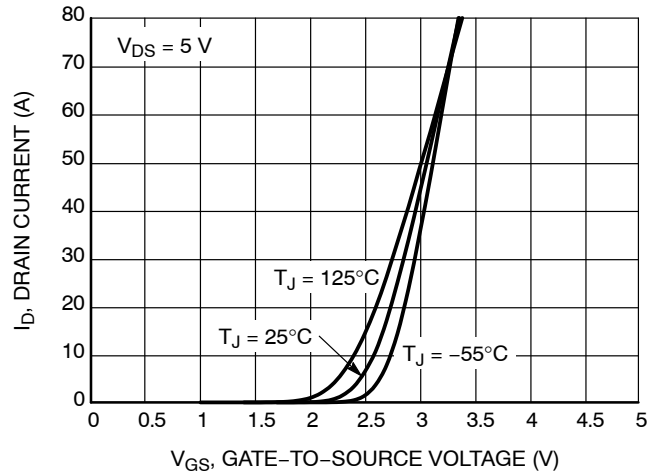


Figure 2. Transfer Characteristics

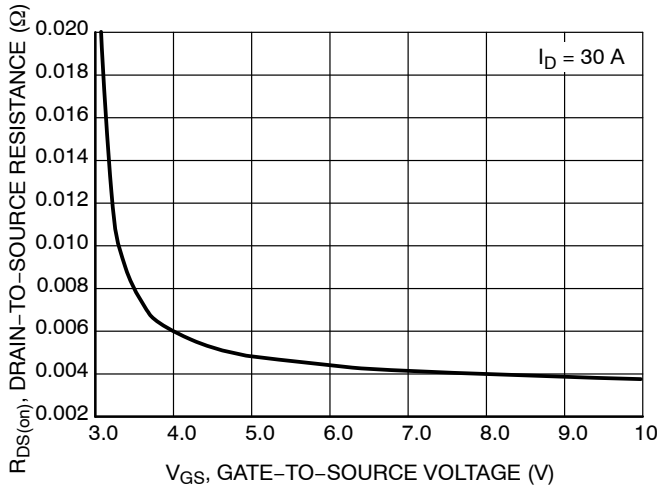


Figure 3. On-Resistance vs. V_{GS}

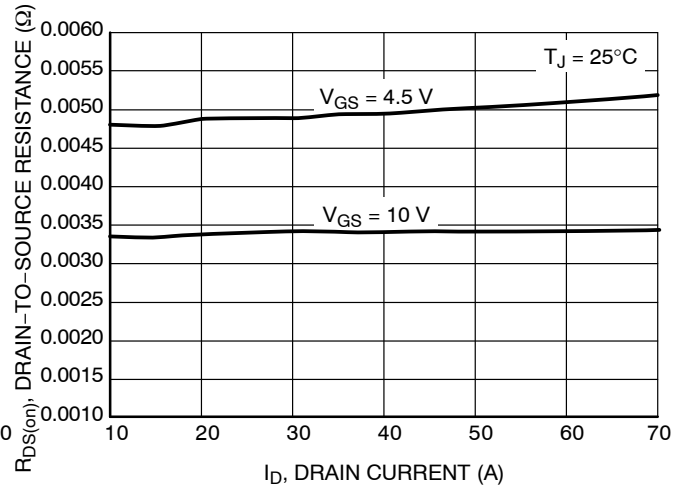


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

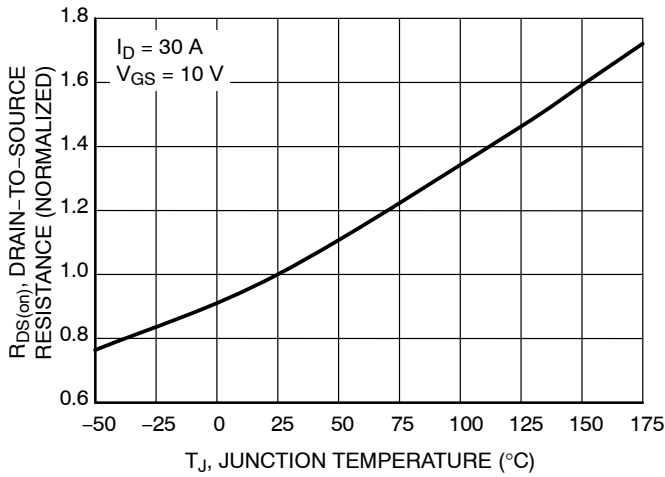


Figure 5. On-Resistance Variation with Temperature

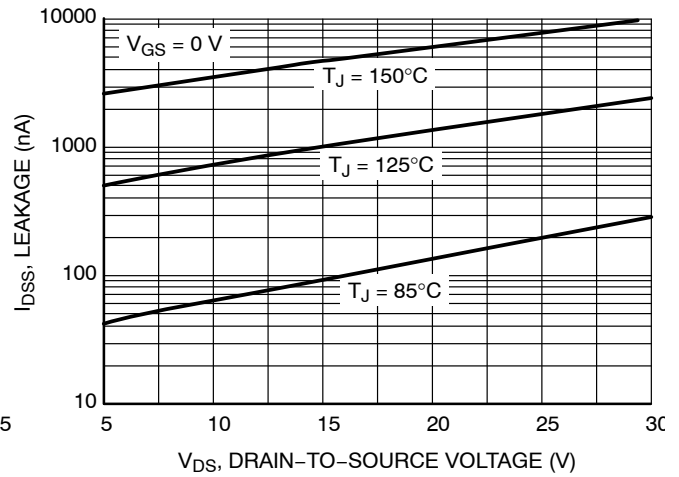


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

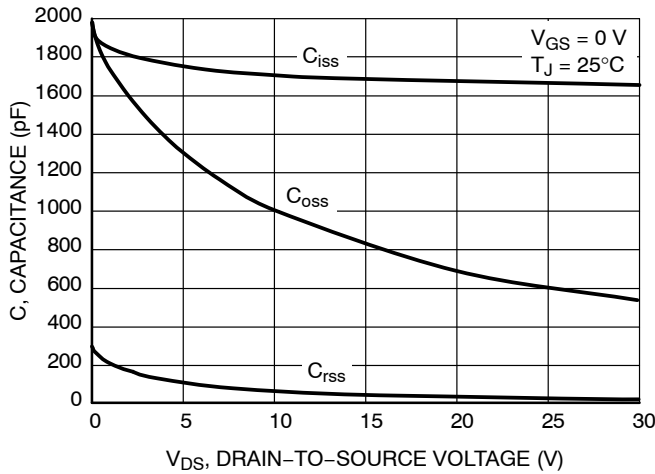


Figure 7. Capacitance Variation

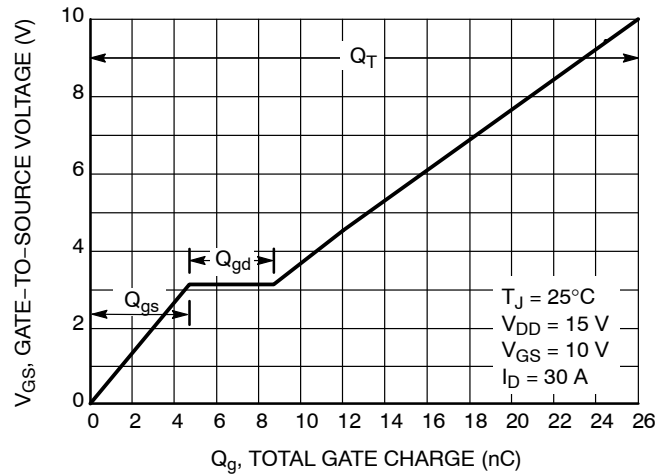


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

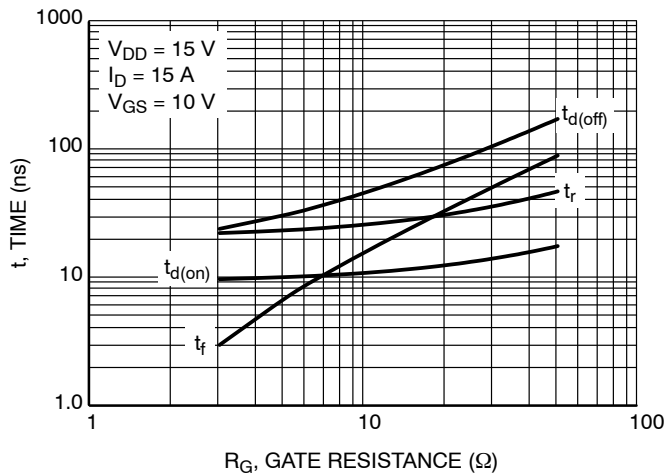


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

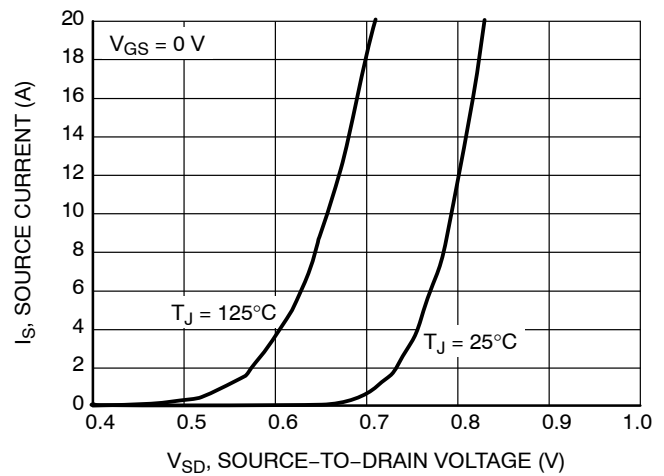


Figure 10. Diode Forward Voltage vs. Current

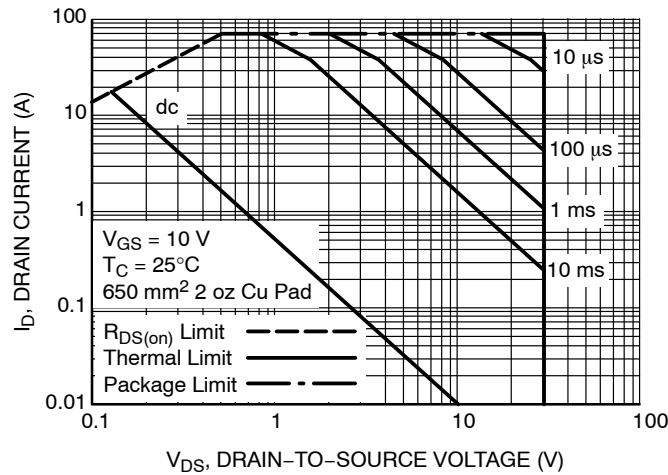


Figure 11. Maximum Rated Forward Biased Safe Operating Area

NVTFS4C06N

TYPICAL CHARACTERISTICS (continued)

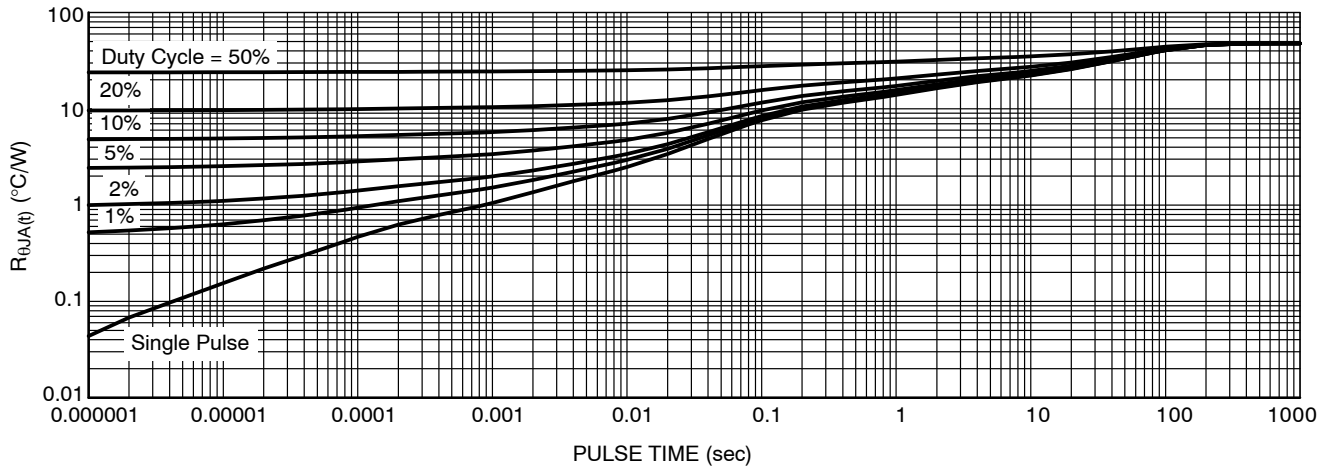


Figure 12. Thermal Response

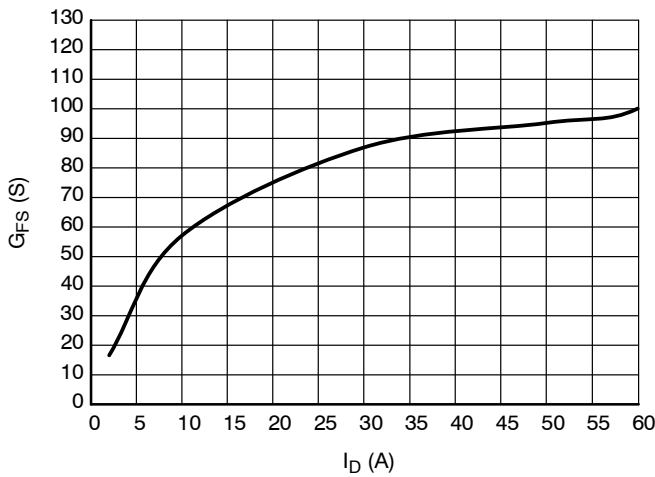


Figure 13. G_{FS} vs. I_D

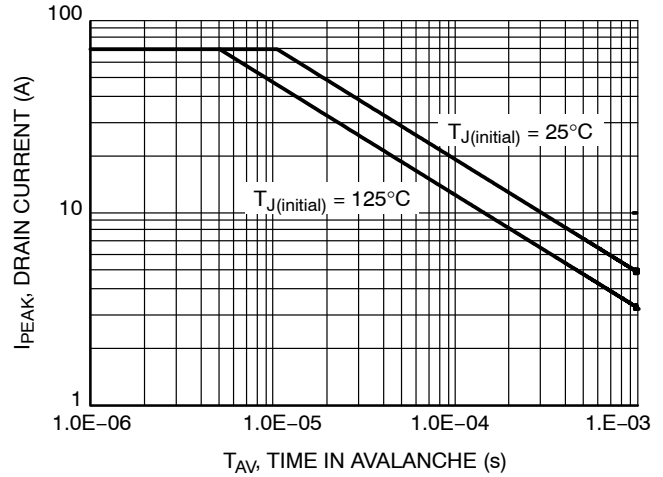


Figure 14. Avalanche Characteristics

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|--------------------------------|--------------------|
| NVTFS4C06NTAG | WDFN8 3.3x3.3, 0.65P (Pb-Free) | 1500 / Tape & Reel |
| NVTFS4C06NTWG | WDFN8 3.3x3.3, 0.65P (Pb-Free) | 5000 / Tape & Reel |

DISCONTINUED (Note 7)

| | | |
|-----------------|---|--------------------|
| NVTFS4C06NWFTAG | WDFNW8 3.3x3.3, 0.65P (Full-Cut μ 8FL WF) (Pb-Free) | 1500 / Tape & Reel |
| NVTFS4C06NWFTWG | WDFNW8 3.3x3.3, 0.65P (Full-Cut μ 8FL WF) (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](#).

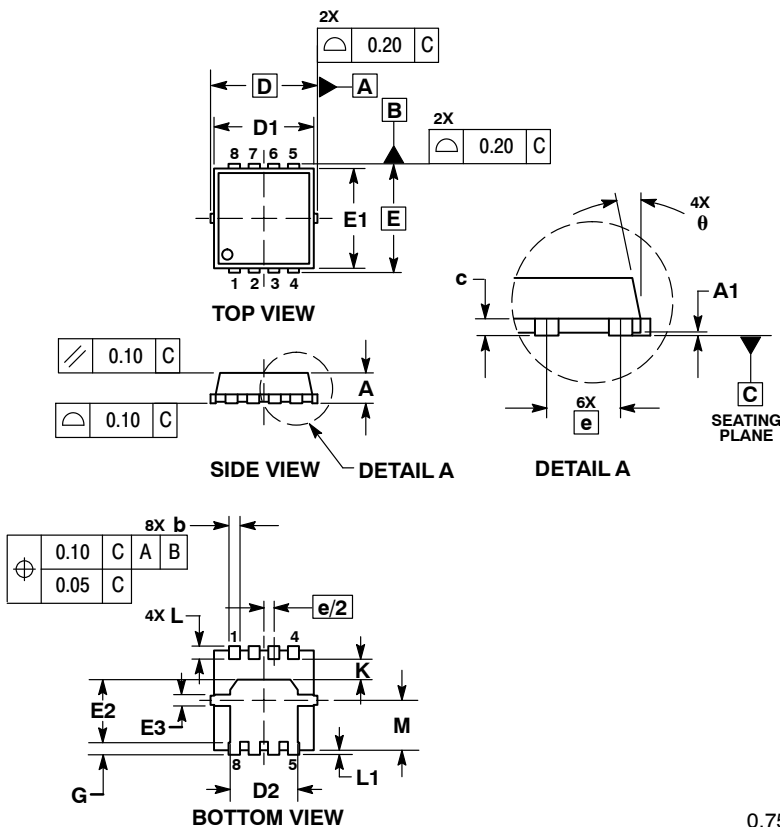
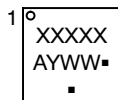
7. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.



SCALE 2:1

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

DATE 23 APR 2012


GENERIC MARKING DIAGRAM*


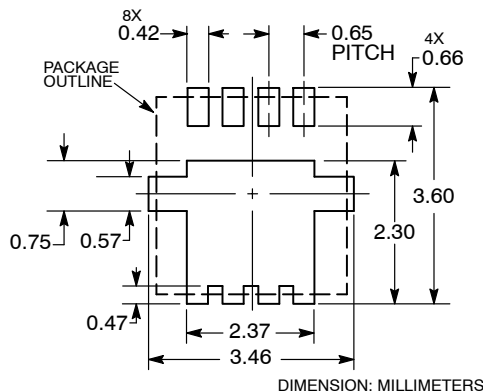
XXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

*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.

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.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|-------|-------|
| | 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 ° |

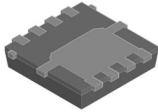
SOLDERING FOOTPRINT*


DIMENSION: MILLIMETERS

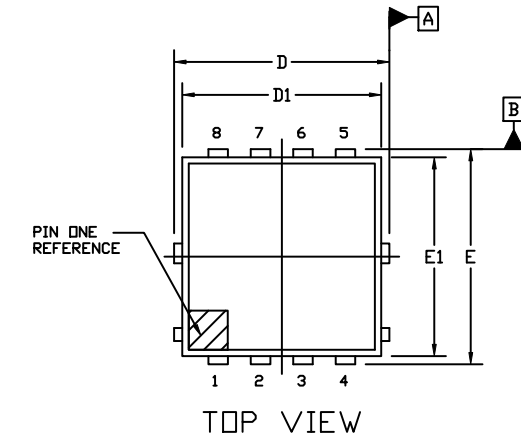
*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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| DESCRIPTION: | WDFN8 3.3X3.3, 0.65P | PAGE 1 OF 1 |

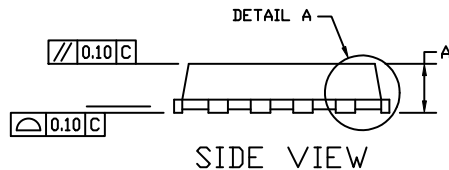
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WDFNW8 3.3x3.3, 0.65P (Full-Cut μ8FL WF)
CASE 515AN
ISSUE O

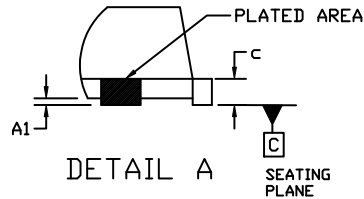
DATE 25 AUG 2020



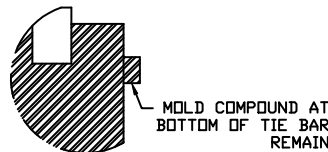
TOP VIEW



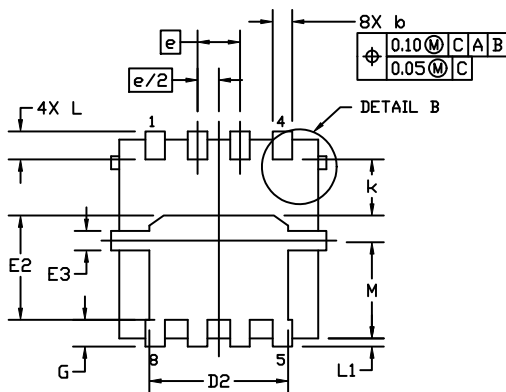
SIDE VIEW



DETAIL A



DETAIL B

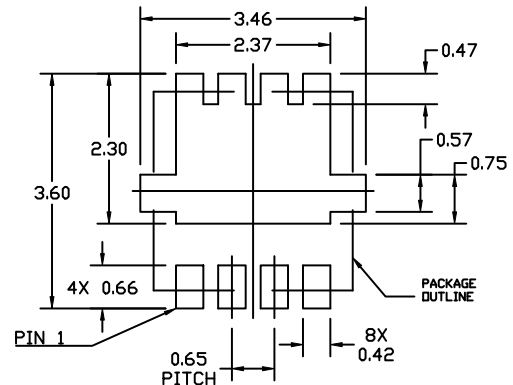


BOTTOM VIEW

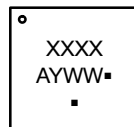
| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN. | NDM. | MAX. |
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | ---- | 0.05 |
| b | 0.23 | 0.30 | 0.40 |
| c | 0.15 | 0.20 | 0.25 |
| D | 3.05 | 3.30 | 3.55 |
| D1 | 2.95 | 3.05 | 3.15 |
| D2 | 1.98 | 2.11 | 2.24 |
| E | 3.05 | 3.30 | 3.55 |
| 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 |

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.


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, SOLDERM/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 |

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ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

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