

NTMFS4108N

Power MOSFET

30 V, 35 A, Single N-Channel,
SO-8 Flat Lead Package

Features

- Thermally and Electrically Enhanced Packaging Compatible with Standard SO-8 Package Footprint
- New Package Provides Capability of Inspection and Probe After Board Mounting
- Ultra Low $R_{DS(on)}$ (at 4.5 V_{GS}), Low Gate Resistance and Low Q_G
- Optimized for Low Side Synchronous Applications
- High Speed Switching Capability
- These are Pb-Free Devices

Applications

- Notebook Computer V_{core} Applications
- Network Applications
- DC-DC Converters

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

| Rating | | | Symbol | Value | Unit |
|---|------------------------|-----------------------|-----------------------------------|----------------|------|
| Drain-to-Source Voltage | | | V _{DSS} | 30 | V |
| Gate-to-Source Voltage | | | V _{GS} | ±20 | V |
| Continuous Drain Current (Note 1) | Steady State | T _A = 25°C | I _D | 22 | A |
| | | T _A = 85°C | | 16 | |
| | t ≤ 10 s | T _A = 25°C | | 35 | |
| Power Dissipation (Note 1) | Steady State | T _A = 25°C | P _D | 2.7 | W |
| | t ≤ 10 s | | | 7.2 | |
| Continuous Drain Current (Note 2) | Steady State | T _A = 25°C | I _D | 13.5 | A |
| | | T _A = 85°C | | 10 | |
| Power Dissipation (Note 2) | Steady State | T _A = 25°C | P _D | 1.1 | W |
| Power Dissipation R _{θJC} (Note 1) | | T _C = 25°C | | P _D | |
| Pulsed Drain Current | t _p = 10 μs | | I _{DM} | 288 | A |
| Operating Junction and Storage Temperature | | | T _J , T _{stg} | -55 to 150 | °C |
| Continuous Source Current (Body Diode) | | | I _S | 6.0 | A |
| Single Pulse Drain-to-Source Avalanche Energy (V _{DD} = 30 V, V _{GS} = 10 V, I _{PK} = 30 A, L = 1 mH, R _G = 25 Ω) | | | E _{AS} | 450 | mJ |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | | T _L | 260 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

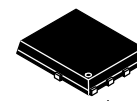
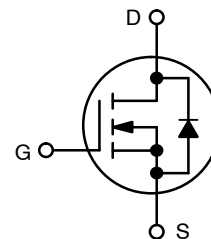
1. Surface-mounted on FR4 board using 1" sq. pad size (Cu area = 650 mm² [1 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size (Cu area = 50 mm²).



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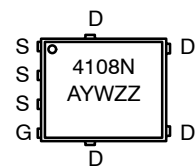
<http://onsemi.com>

| V _{(BR)DSS} | R _{DS(on)} TYP | I _D MAX |
|----------------------|-------------------------|--------------------|
| 30 V | 1.8 mΩ @ 10 V | 35 A |
| | 2.7 mΩ @ 4.5 V | |



SO-8 FLAT LEAD
CASE 488AA
STYLE 1

MARKING DIAGRAM



4108N = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|-------------------|------------------|
| NTMFS4108NT1G | SO-8 FL (Pb-Free) | 1500 Tape / Reel |
| NTMFS4108NT3G | SO-8 FL (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 Specification Brochure, BRD8011/D.

NTMFS4108N

THERMAL RESISTANCE RATINGS

| Rating | Symbol | Max | Unit |
|--|-----------------|------|------|
| Junction-to-Case (Drain Terminal) | $R_{\theta JC}$ | 1.3 | °C/W |
| Junction-to-Ambient - Steady State (Note 3) | $R_{\theta JA}$ | 45.7 | |
| Junction-to-Ambient - $t \leq 10$ s (Note 3) | $R_{\theta JA}$ | 17.3 | |
| Junction-to-Ambient - Steady State (Note 4) | $R_{\theta JA}$ | 117 | |

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

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|----------------|--------|----------------|-----|-----|-----|------|
|----------------|--------|----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|---|-------------------|---|---------------------------|----|-----|---------------|
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0$ V, $I_D = 250$ μA | 30 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | | | 21 | | mV/°C |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0$ V, $V_{DS} = 24$ V | $T_J = 25^\circ\text{C}$ | | 1.0 | μA |
| | | | $T_J = 125^\circ\text{C}$ | | 25 | |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0$ V, $V_{GS} = 20$ V | | | 100 | nA |

ON CHARACTERISTICS (Note 5)

| | | | | | | |
|--|------------------|---|-----|-----|-----|------------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}$, $I_D = 250$ μA | 1.0 | | 2.5 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | 7.5 | | mV/°C |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS} = 4.5$ V, $I_D = 19$ A | | 2.7 | 3.4 | m Ω |
| | | $V_{GS} = 10$ V, $I_D = 21$ A | | 1.8 | 2.2 | |
| Forward Transconductance | g_{FS} | $V_{DS} = 15$ V, $I_D = 10$ A | | 25 | | S |

CHARGES, CAPACITANCES AND GATE RESISTANCE

| | | | | | | |
|------------------------------|--------------|---|--|------|--|----|
| Input Capacitance | C_{ISS} | $V_{GS} = 0$ V, $f = 1.0$ MHz, $V_{DS} = 15$ V | | 6000 | | pF |
| Output Capacitance | C_{OSS} | | | 1200 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 700 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 4.5$ V, $V_{DS} = 24$ V, $I_D = 21$ A | | 54 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 11 | | |
| Gate-to-Source Charge | Q_{GS} | | | 16 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 23 | | |
| Gate Resistance | R_G | | | 0.7 | | |

SWITCHING CHARACTERISTICS, $V_{GS} = 10$ V (Note 6)

| | | | | | | |
|---------------------|--------------|---|--|-----|--|----|
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS} = 4.5$ V, $V_{DS} = 15$ V, $I_D = 1.0$ A, $R_G = 6.0$ Ω | | 45 | | ns |
| Rise Time | t_r | | | 60 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 70 | | |
| Fall Time | t_f | | | 140 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-------------------------|----------|---|---------------------------|--|------|-----|----|
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0$ V, $I_S = 6.0$ A | $T_J = 25^\circ\text{C}$ | | 0.72 | 1.1 | V |
| | | | $T_J = 125^\circ\text{C}$ | | 0.65 | | |
| Reverse Recovery Time | t_{RR} | $V_{GS} = 0$ V, $dI_S/dt = 100$ A/ μs , $I_S = 6.0$ A | | | 41 | | ns |
| Charge Time | t_a | | | | 20 | | |
| Discharge Time | t_b | | | | 21 | | |
| Reverse Recovery Charge | Q_{RR} | | | | 45 | | nC |

- Surface-mounted on FR4 board using 1" sq. pad size (Cu area = 650 mm² [1 oz] including traces).
- Surface-mounted on FR4 board using the minimum recommended pad size (Cu area = 50 mm²).
- Pulse Test: Pulse Width ≤ 300 μs , Duty Cycle $\leq 2\%$.
- Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

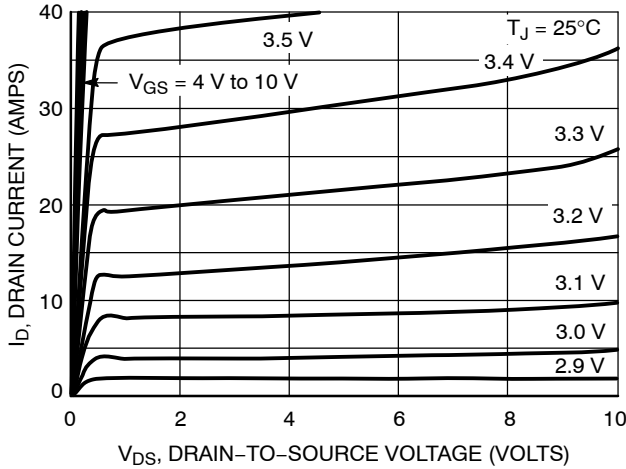


Figure 1. On-Region Characteristics

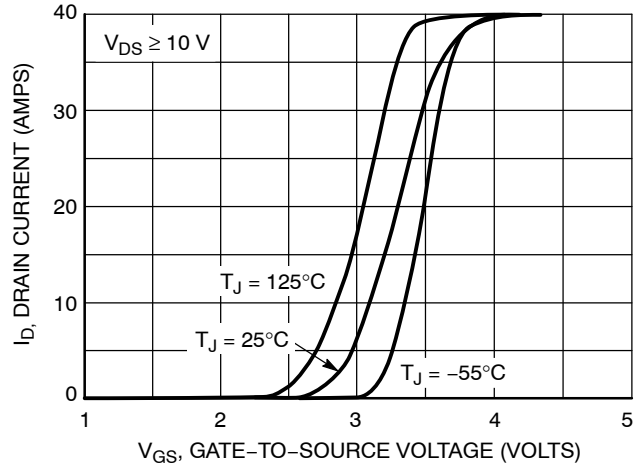


Figure 2. Transfer Characteristics

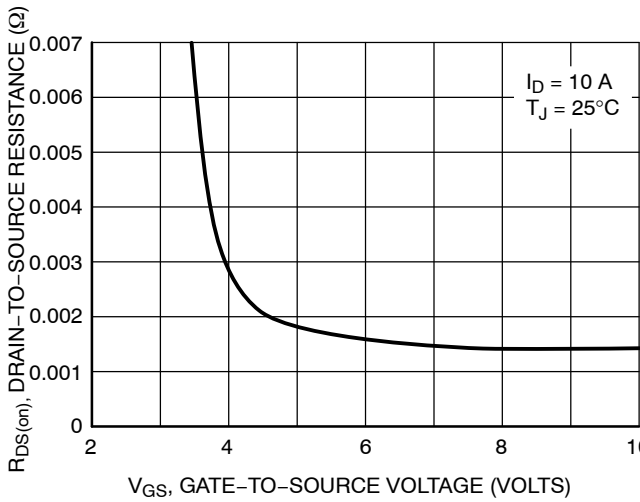


Figure 3. On-Resistance vs. Gate-to-Source Voltage

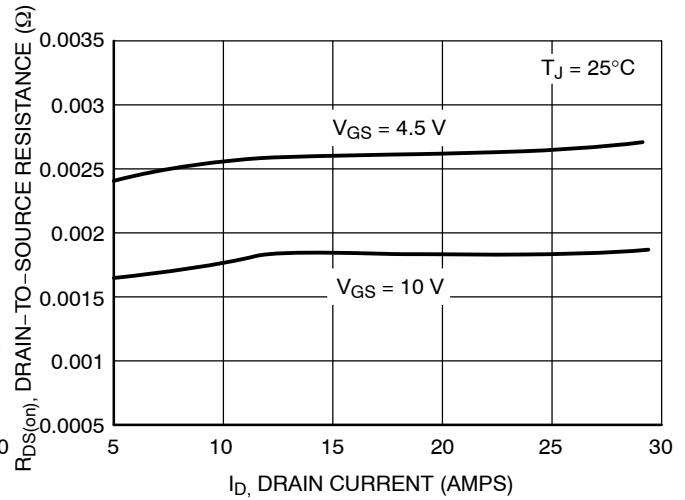


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

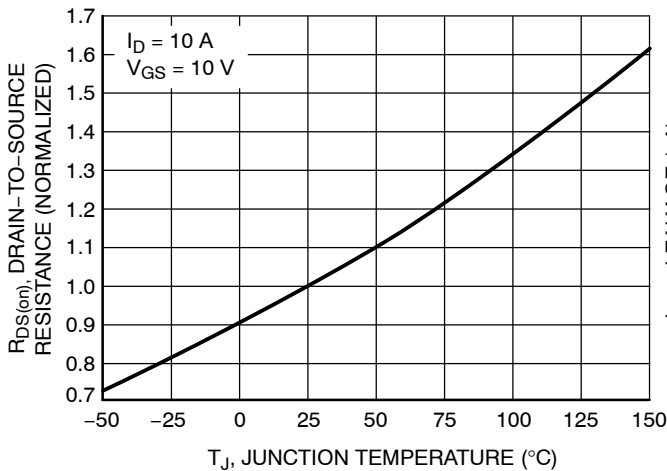


Figure 5. On-Resistance Variation with Temperature

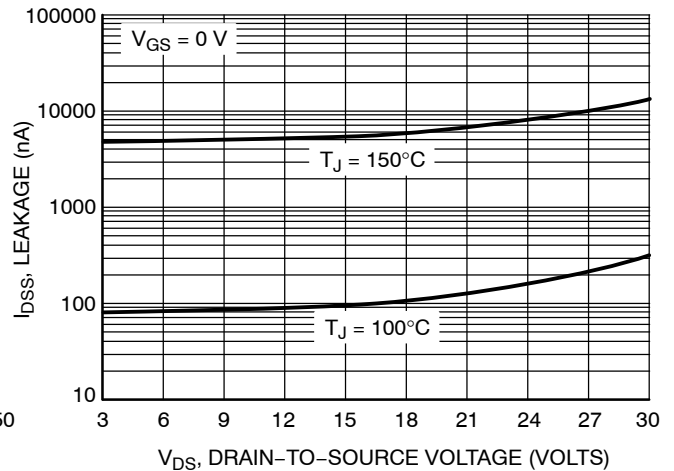


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES

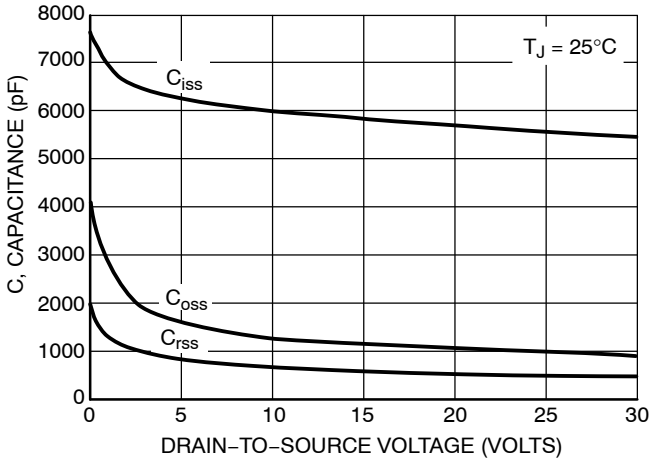


Figure 7. Capacitance Variation

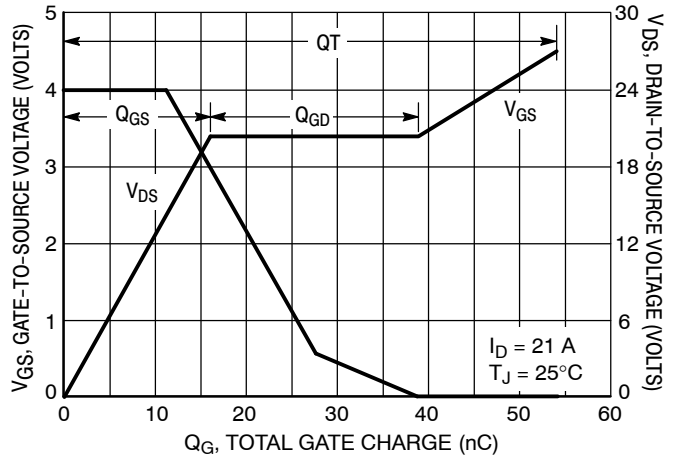


Figure 8. Gate-To-Source and Drain-To-Source Voltage vs. Total Charge

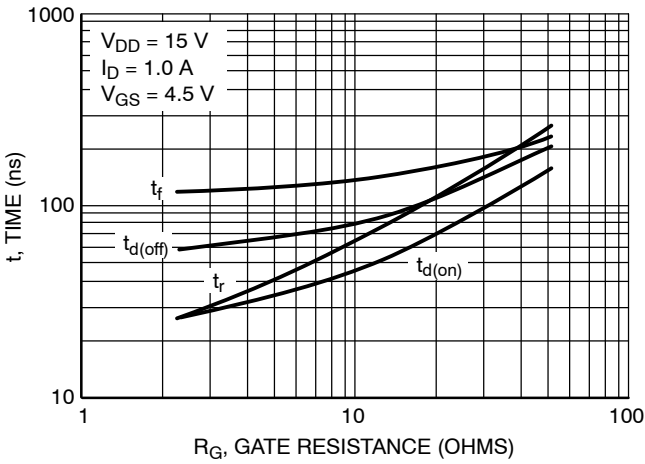


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

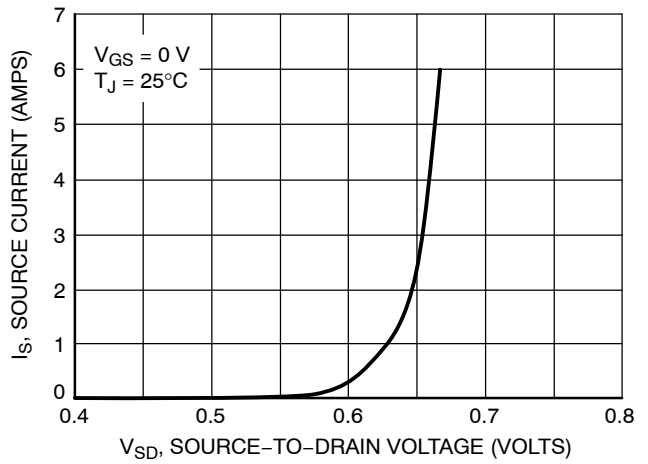


Figure 10. Diode Forward Voltage vs. Current

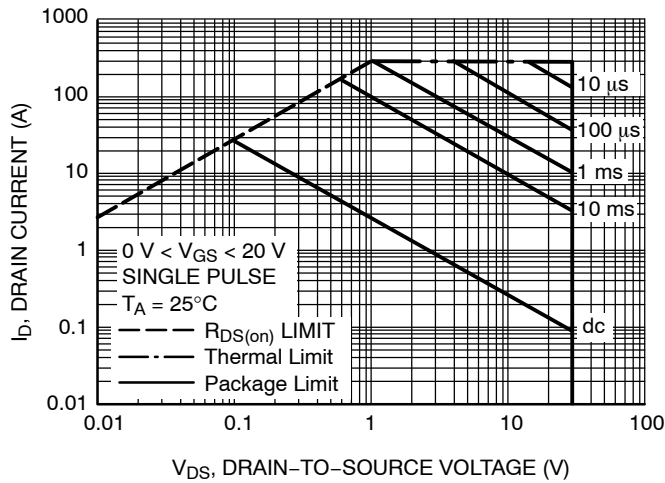


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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TYPICAL PERFORMANCE CURVES

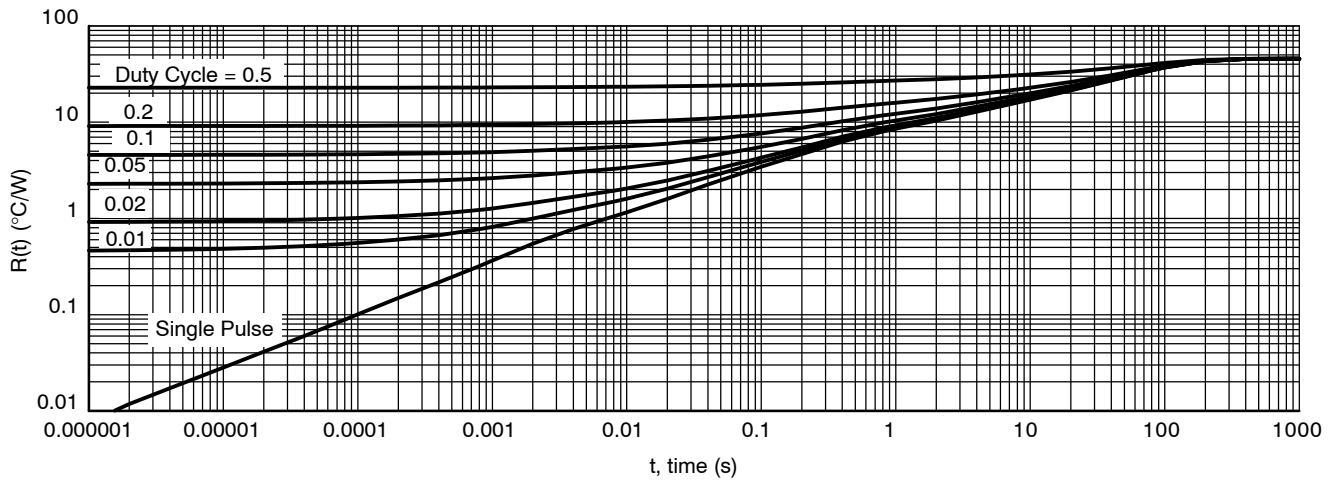
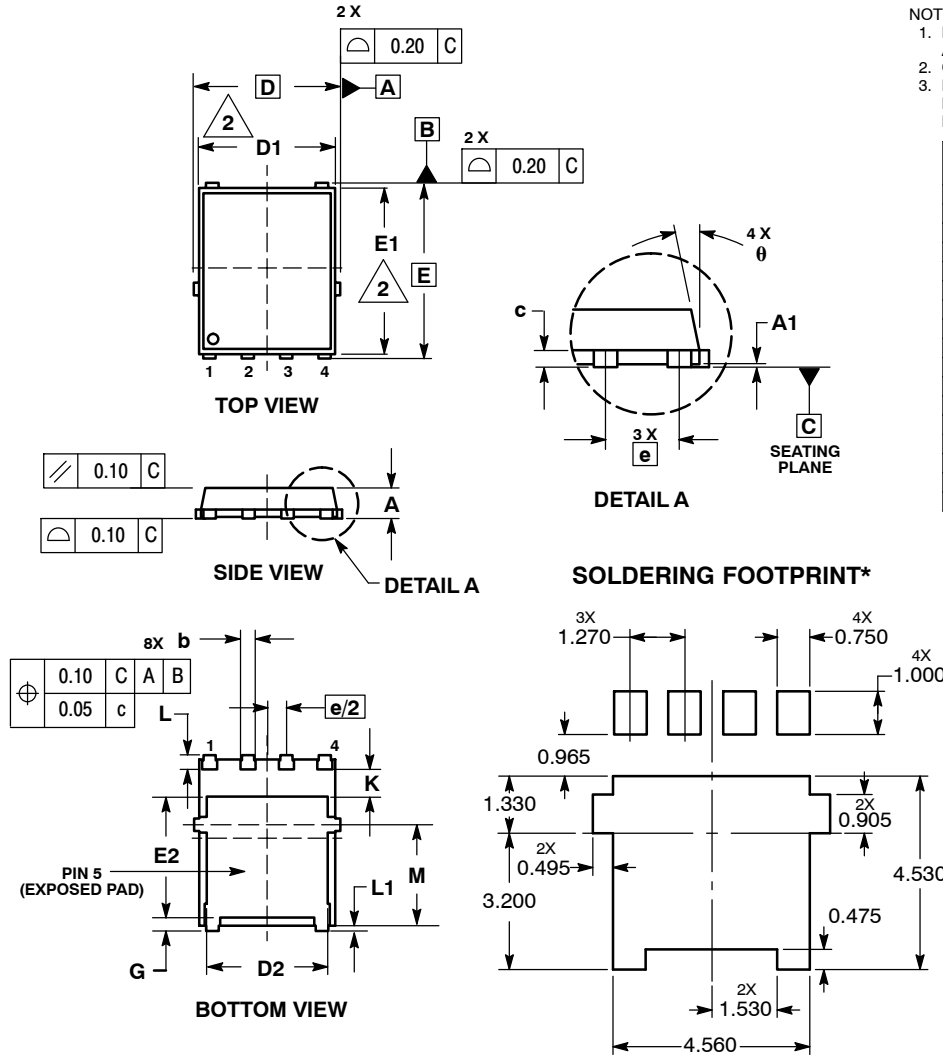


Figure 12. FET Thermal Response

NTMFS4108N

PACKAGE DIMENSIONS

DFN5 5x6, 1.27P
(SO-8FL)
CASE 488AA
ISSUE G



NOTES:

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

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN | NOM | MAX |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.00 | --- | 0.05 |
| b | 0.33 | 0.41 | 0.51 |
| c | 0.23 | 0.28 | 0.33 |
| D | 5.15 BSC | | |
| D1 | 4.50 | 4.90 | 5.10 |
| D2 | 3.50 | --- | 4.22 |
| E | 6.15 BSC | | |
| E1 | 5.50 | 5.80 | 6.10 |
| E2 | 3.45 | --- | 4.30 |
| e | 1.27 BSC | | |
| G | 0.51 | 0.61 | 0.71 |
| K | 1.20 | 1.35 | 1.50 |
| L | 0.51 | 0.61 | 0.71 |
| L1 | 0.05 | 0.17 | 0.20 |
| M | 3.00 | 3.40 | 3.80 |
| θ | 0 ° | --- | 12 ° |

STYLE 1:

1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN

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

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