

NTMFS4708N

Power MOSFET

30 V, 19 A, Single N-Channel, SOIC-8 FL

Features

- Fast Switching Times
- Low Gate Charge
- Low $R_{DS(on)}$
- Low Inductance SOIC-8 Package
- These are Pb-Free Devices

Applications

- Notebooks, Graphics Cards
- DC-DC Converters
- Synchronous Rectification

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | | | 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 | 11.5 | A |
| | | T _A = 85°C | | 8.0 | |
| | t ≤ 10 s | T _A = 25°C | | 19 | |
| Power Dissipation (Note 1) | Steady State | T _A = 25°C | P _D | 2.2 | W |
| | t ≤ 10 s | | | 6.25 | |
| Continuous Drain Current (Note 2) | Steady State | T _A = 25°C | I _D | 7.8 | A |
| | | T _A = 85°C | | 5.6 | |
| Power Dissipation (Note 2) | | T _A = 25°C | P _D | 1.0 | W |
| Pulsed Drain Current | t _p ≤ 10 μs | | I _{DM} | 58 | A |
| Operating Junction and Storage Temperature | | | T _J , T _{STG} | -55 to 150 | °C |
| Source Current (Body Diode) | | | I _S | 6.25 | A |
| Single Pulse Drain-to-Source Avalanche Energy. V _{DD} = 25 V, V _{GS} = 10 V, I _{PK} = 7.0 A, L = 10 mH, R _G = 25 Ω | | | E _{AS} | 245 | mJ |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | | T _L | 260 | °C |

THERMAL RESISTANCE MAXIMUM RATINGS

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------|--------------------|
| Junction-to-Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 56.5 | $^\circ\text{C/W}$ |
| Junction-to-Ambient – $t \leq 10\text{ s}$ (Note 1) | $R_{\theta JA}$ | 20 | |
| Junction-to-Ambient – Steady State (Note 2) | $R_{\theta JA}$ | 124 | |

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.

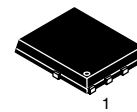
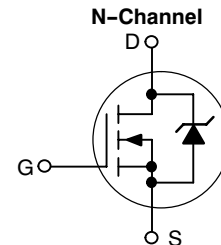
1. Surface-mounted on FR4 board using 1 in sq pad size
(Cu area = 1.127 in sq [1 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size
(Cu area = 0.412 in sq).



ON Semiconductor®

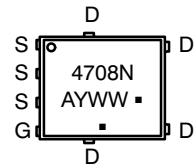
<http://onsemi.com>

| $V_{(BR)DSS}$ | $R_{DS(on)}$ Typ | I_D Max |
|---------------|-------------------------|-----------|
| 30 V | 7.3 m Ω @ 10 V | 19 A |
| | 10.1 m Ω @ 4.5 V | |



SOIC-8 FLAT LEAD
CASE 488AA
STYLE 1

MARKING DIAGRAM & PIN ASSIGNMENT



4708N = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|------------------------|----------------------------|
| NTMFS4708NT1G | SOIC-8 FL (Pb-Free) | 1500 / \bar{a} pe & Reel |
| NTMFS4708NT3G | SOIC-8 FL (Pb-Free) | 5000 / \bar{a} pe & 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.

NTMFS4708N

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

| Parameter | 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 | | | 10 | | mV/°C |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V, V _{DS} = 24 V | T _J = 25°C | | 1.0 | μA |
| | | | T _J = 125°C | | 50 | |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±20V | | | ±100 | nA |

ON CHARACTERISTICS (Note 3)

| | | | | | | |
|--|-------------------------------------|---|-----|------|-----|-------|
| 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 | | | 5.0 | | mV/°C |
| Drain-to-Source On Resistance | R _{DS(on)} | V _{GS} = 10 V, I _D = 11.5 A | | 7.3 | 10 | mΩ |
| | | V _{GS} = 4.5 V, I _D = 9.5 A | | 10.1 | 14 | |
| Forward Transconductance | g _{FS} | V _{DS} = 15 V, I _D = 11.5 A | | 23 | | S |

CHARGES, CAPACITANCES AND GATE RESISTANCE

| | | | | | | |
|------------------------------|---------------------|--|--|------|----|----|
| Input Capacitance | C _{ISS} | V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 24 V | | 970 | | pF |
| Output Capacitance | C _{OSS} | | | 440 | | |
| Reverse Transfer Capacitance | C _{RSS} | | | 115 | | |
| Total Gate Charge | Q _{G(TOT)} | V _{GS} = 4.5 V, V _{DS} = 15 V; I _D = 11.5 A | | 10 | 15 | nC |
| Threshold Gate Charge | Q _{G(TH)} | | | 1.3 | | |
| Gate-to-Source Charge | Q _{GS} | | | 2.6 | | |
| Gate-to-Drain Charge | Q _{GD} | | | 4.8 | | |
| Gate Resistance | R _G | | | 1.95 | | Ω |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|---------------------|--|--|-----|--|----|
| Turn-On Delay Time | t _{d(on)} | V _{GS} = 10 V, V _{DD} = 15 V, I _D = 1.0 A, R _G = 3.0 Ω | | 6.7 | | ns |
| Rise Time | t _r | | | 4.3 | | |
| Turn-Off Delay Time | t _{d(off)} | | | 20 | | |
| Fall Time | t _f | | | 16 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-------------------------|-----------------|--|------------------------|------|------|-----|----|
| Forward Diode Voltage | V _{SD} | V _{GS} = 0 V, I _S = 6.25 A | T _J = 25°C | | 0.78 | 1.0 | V |
| | | | T _J = 125°C | | 0.60 | | |
| Reverse Recovery Time | t _{RR} | V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 6.25 A | | 32 | | | ns |
| Charge Time | t _a | | | 15.5 | | | |
| Discharge Time | t _b | | | 16.5 | | | |
| Reverse Recovery Charge | Q _{RR} | | | 24 | | | nC |

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

4. Switching characteristics are independent of operating junction temperatures.

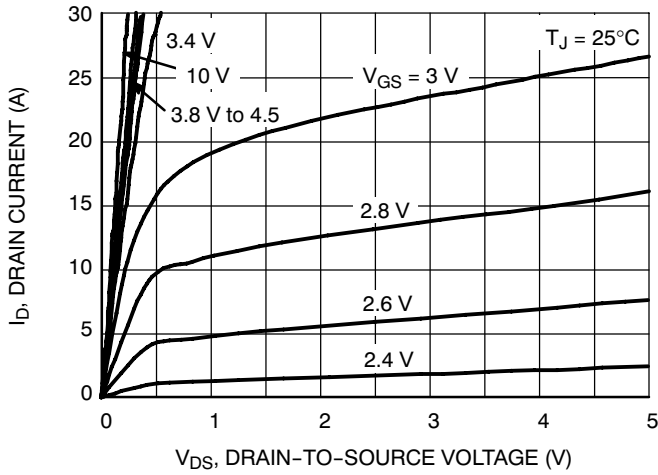


Figure 1. On-Region Characteristics

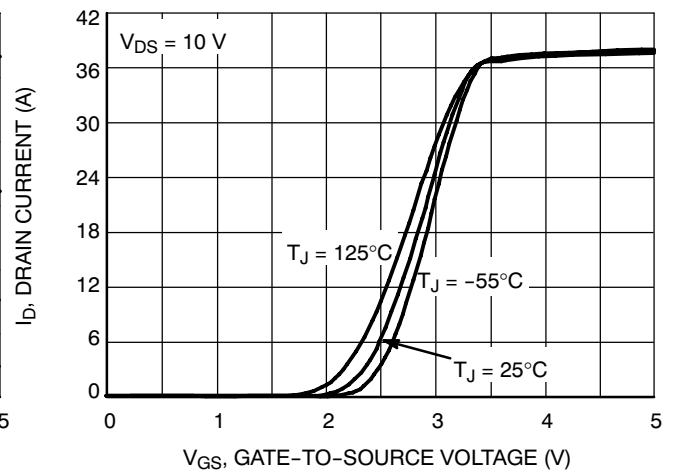


Figure 2. Transfer Characteristics

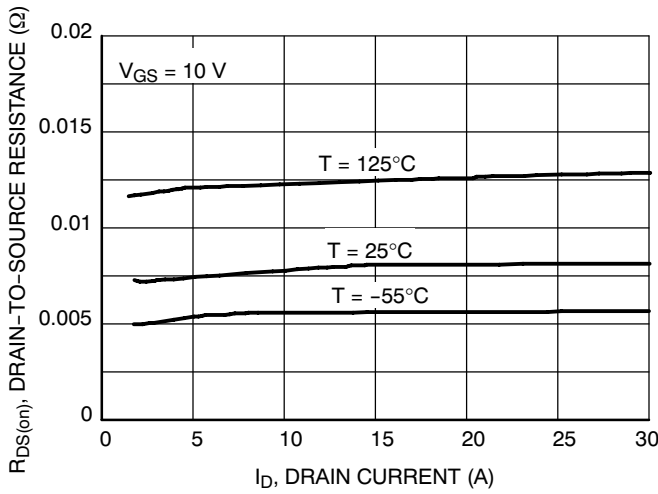


Figure 3. On-Resistance versus Drain Current and Temperature

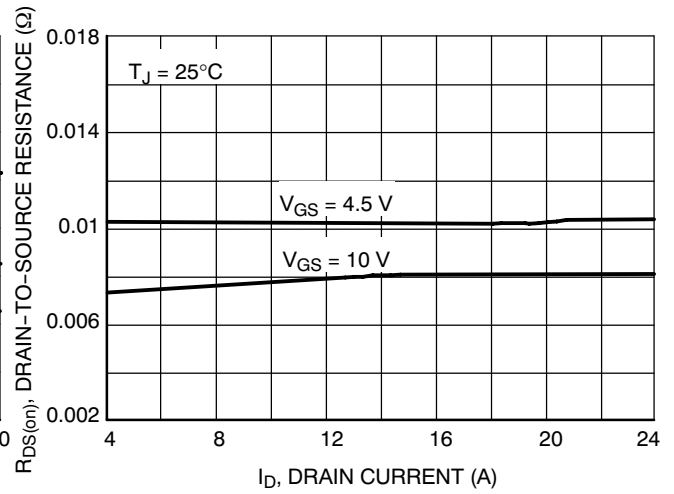


Figure 4. On-Resistance versus Drain Current and Gate Voltage

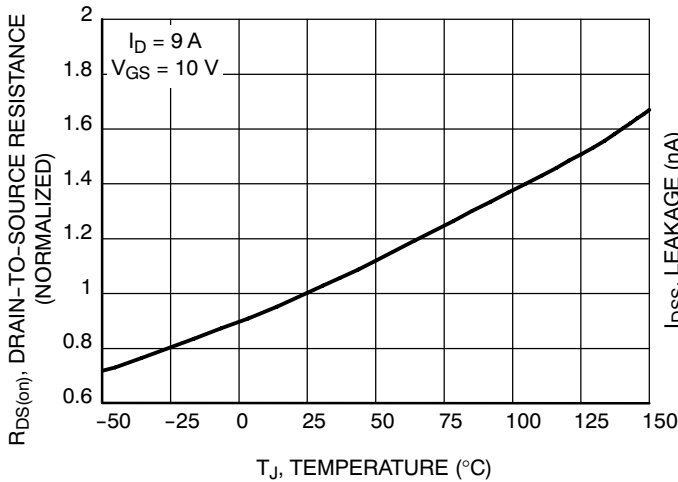


Figure 5. On-Resistance Variation with Temperature

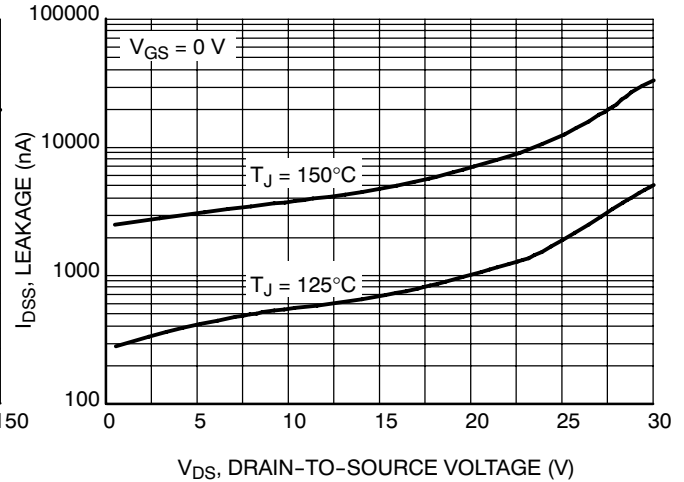
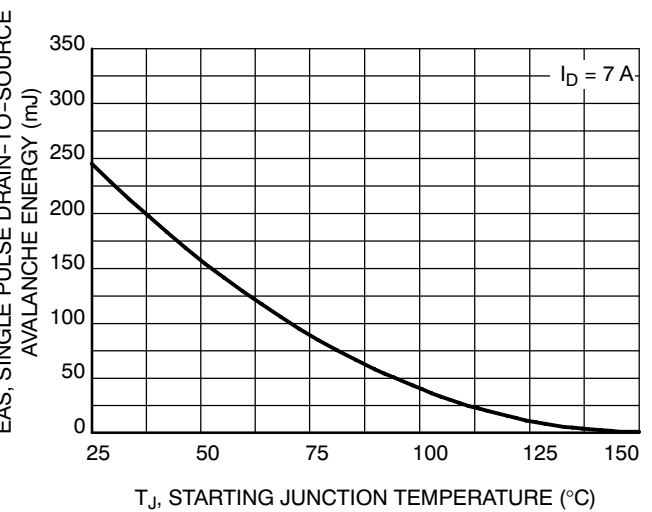
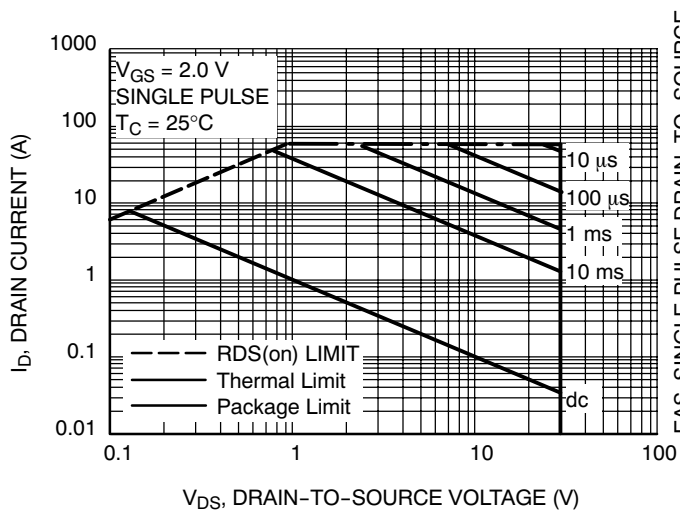
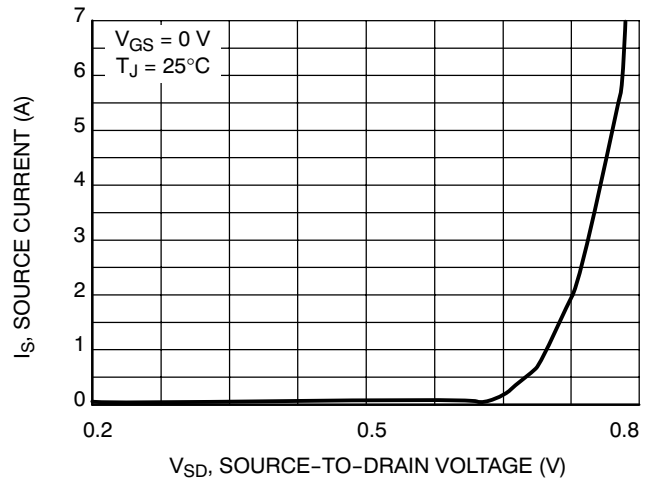
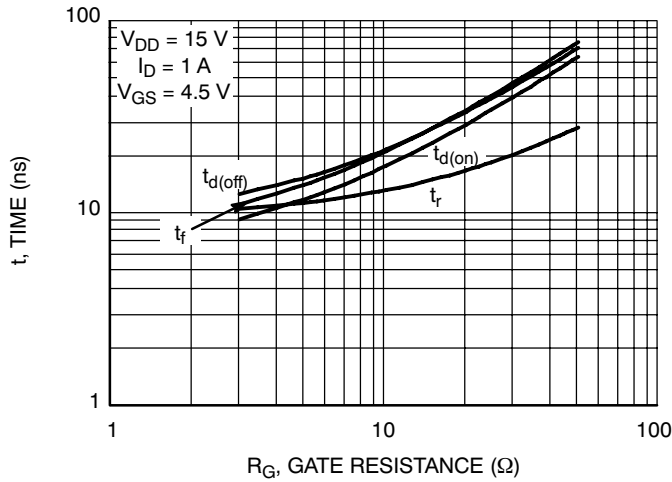
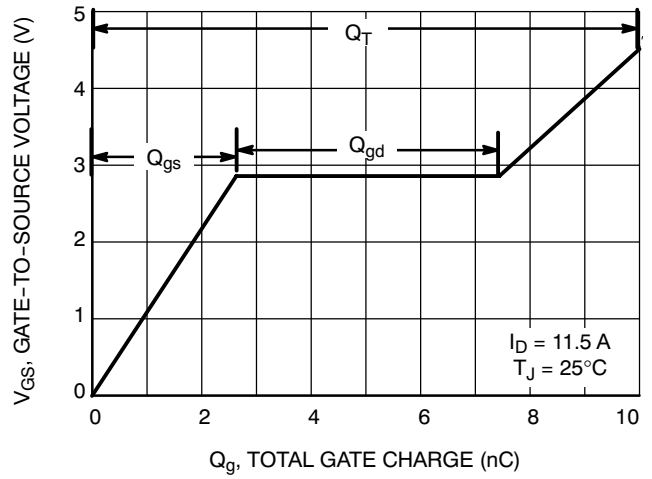
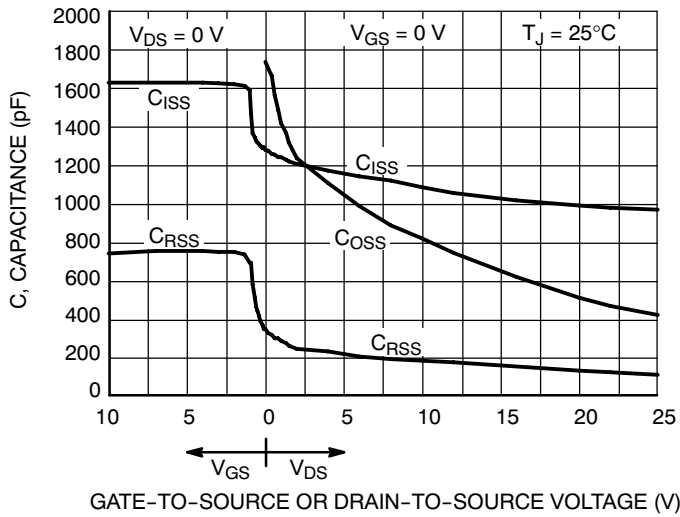


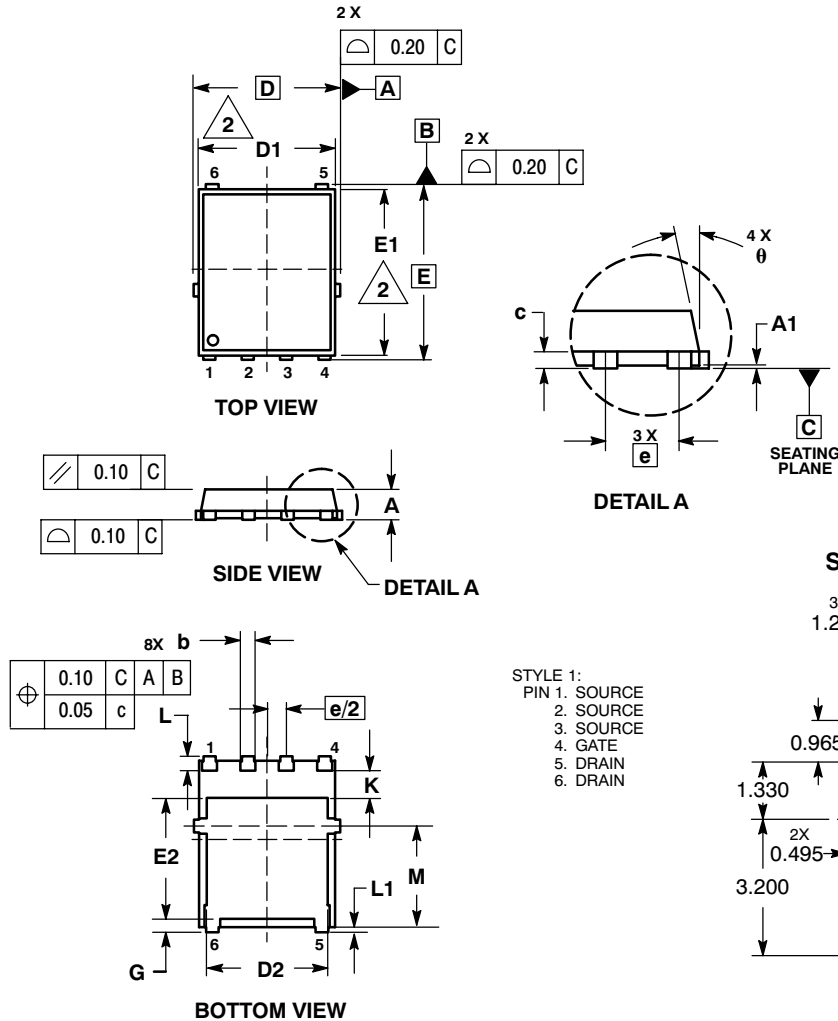
Figure 6. Drain-to-Source Leakage Current versus Voltage



NTMFS4708N

PACKAGE DIMENSIONS

DFN6 5x6, 1.27P (SO8 FL)
CASE 488AA-01
ISSUE C

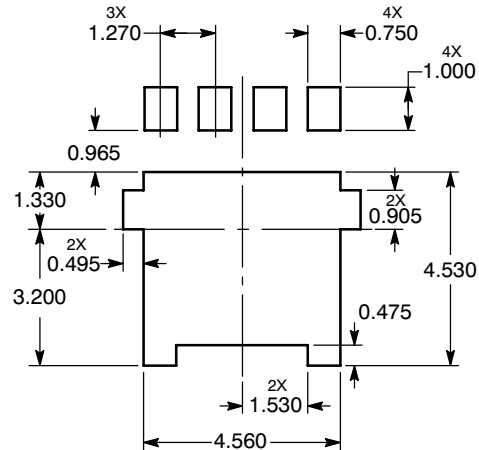


NOTES:

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.

| MILLIMETERS | | | |
|-------------|----------|------|------|
| DIM | 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 | 0.51 | --- | --- |
| L | 0.51 | 0.61 | 0.71 |
| L1 | 0.05 | 0.17 | 0.20 |
| M | 3.00 | 3.40 | 3.80 |
| θ | 0 ° | --- | 12 ° |

SOLDERING 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.

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