



**THE DATASHEET OF
NTS4173PT1G**



NTS4173P

MOSFET – Power, Single, P-Channel, SC-70 -30 V, -1.3 A

Features

- -30 V BV_{DS} , Low $R_{DS(on)}$ in SC-70 Package
- Low Threshold Voltage
- Fast Switching Speed
- This is a Halide-Free Device
- This is a Pb-Free Device

Applications

- Load Switch
- Low Current Inverter and DC-DC Converters
- Power Switch for Printers, Communication Equipment

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

| Parameter | | Symbol | Value | Unit |
|---|------------------------|--------------------------|--------------------------|------------------|
| Drain-to-Source Voltage | | V_{DSS} | -30 | V |
| Gate-to-Source Voltage | | V_{GS} | ± 12 | V |
| Continuous Drain Current (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | -1.2 | A |
| | | | $T_A = 85^\circ\text{C}$ | |
| | $t \leq 5$ s | $T_A = 25^\circ\text{C}$ | -1.3 | |
| Power Dissipation (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | 0.29 | W |
| | | | $t \leq 5$ s | |
| Pulsed Drain Current | $t_p = 10 \mu\text{s}$ | I_{DM} | -5.0 | A |
| Operating Junction and Storage Temperature | | T_J, T_{stg} | -55 to 150 | $^\circ\text{C}$ |
| Source Current (Body Diode) | | I_S | -1.0 | A |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | T_L | 260 | $^\circ\text{C}$ |

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.

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|-----------------|-----|---------------------------|
| Junction-to-Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 425 | $^\circ\text{C}/\text{W}$ |
| Junction-to-Ambient – $t \leq 5$ s (Note 1) | $R_{\theta JA}$ | 360 | |

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

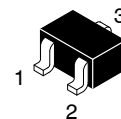
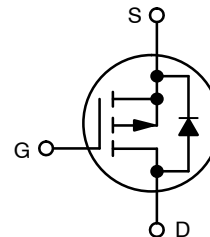


ON Semiconductor®

<http://onsemi.com>

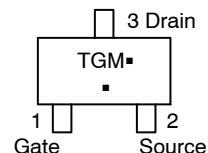
| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX | I_D MAX |
|---------------|-------------------------|-----------|
| -30 V | 150 m Ω @ -10 V | -1.2 A |
| | 200 m Ω @ -4.5 V | -1.0 A |
| | 280 m Ω @ -2.5 V | -0.9 A |

SC-70/SOT-323 (3 LEADS)



SC-70/SOT-323
CASE 419
STYLE 8

MARKING DIAGRAM/ PIN ASSIGNMENT



TG = Specific Device Code
M = Date Code*
▪ = Pb-Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device | Package | Shipping† |
|-------------|-----------------|------------------|
| NTS4173PT1G | SC-70 (Pb-Free) | 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.

* Date code orientation may vary depending upon manufacturing location

NTS4173P

MOSFET ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|-----------|--------|----------------|-----|-----|-----|-------|
|-----------|--------|----------------|-----|-----|-----|-------|

OFF CHARACTERISTICS

| | | | | | | |
|-----------------------------------|----------------------|--|-----|--|--------------|----|
| Drain-to-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = -250 μA | -30 | | | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V, V _{DS} = -24 V, T _J = 25°C V _{GS} = 0 V, V _{DS} = -24 V, T _J = 85°C | | | -1.0 -5.0 | μA |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±12 V | | | ±0.1 | μA |

ON CHARACTERISTICS (Note 3)

| | | | | | | |
|-------------------------------|---------------------|--|------|-------|------|----|
| Gate Threshold Voltage | V _{GS(TH)} | V _{GS} = V _{DS} , I _D = -250 μA | -0.7 | -1.15 | -1.5 | V |
| Drain-to-Source On-Resistance | R _{DS(on)} | V _{GS} = -10 V, I _D = -1.2 A | | 90 | 150 | mΩ |
| | | V _{GS} = -4.5 V, I _D = -1.0 A | | 110 | 200 | |
| | | V _{GS} = -2.5 V, I _D = -0.9 A | | 165 | 280 | |
| Forward Transconductance | g _{FS} | V _{DS} = -5 V, I _D = -1.2 A | | 3.6 | | S |

CHARGES, CAPACITANCES AND GATE RESISTANCE

| | | | | | | |
|------------------------------|---------------------|---|--|------|--|----|
| Input Capacitance | C _{iss} | V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = -15 V | | 430 | | pF |
| Output Capacitance | C _{oss} | | | 55 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 40 | | |
| Total Gate Charge | Q _{G(TOT)} | V _{GS} = -4.5 V, V _{DS} = -15 V, I _D = -1.2 A | | 4.8 | | nC |
| Threshold Gate Charge | Q _{G(TH)} | | | 0.6 | | |
| Gate-to-Source Charge | Q _{GS} | | | 1.1 | | |
| Gate-to-Drain Charge | Q _{GD} | | | 1.5 | | |
| Total Gate Charge | Q _{G(TOT)} | V _{GS} = -10 V, V _{DS} = -15 V, I _D = -1.2 A | | 10.1 | | nC |
| Threshold Gate Charge | Q _{G(TH)} | | | 0.6 | | |
| Gate-to-Source Charge | Q _{GS} | | | 1.1 | | |
| Gate-to-Drain Charge | Q _{GD} | | | 1.5 | | |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|---------------------|---|--|------|--|----|
| Turn-On Delay Time | t _{d(on)} | V _{GS} = -4.5 V, V _{DS} = -15 V, I _D = -1.2 A, R _G = 3 Ω | | 7.7 | | ns |
| Rise Time | t _r | | | 5.2 | | |
| Turn-Off Delay Time | t _{d(off)} | | | 16.2 | | |
| Fall Time | t _f | | | 6.7 | | |
| Turn-On Delay Time | t _{d(on)} | V _{GS} = -10 V, V _{DS} = -15 V, I _D = -1.2 A, R _G = 3 Ω | | 5.3 | | ns |
| Rise Time | t _r | | | 6.7 | | |
| Turn-Off Delay Time | t _{d(off)} | | | 19.9 | | |
| Fall Time | t _f | | | 7.1 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|-------------------------|-----------------|--|--|------|------|----|
| Forward Diode Voltage | V _{SD} | V _{GS} = 0 V, I _S = -1.0 A | | -0.8 | -1.0 | V |
| Reverse Recovery Time | t _{RR} | V _{DS} = 20 V, V _{GS} = 0 V, I _S = -1.0 A, dI _{SD} /dt = 100 A/μs | | 12 | | ns |
| Charge Time | t _a | | | 10 | | |
| Discharge Time | t _b | | | 2.0 | | |
| Reverse Recovery Charge | Q _{RR} | | | 7.0 | | nC |

- Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces)
- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%
- Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

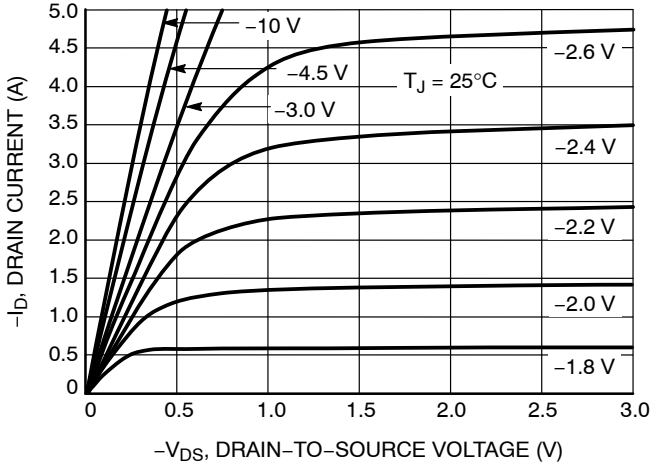


Figure 1. On-Region Characteristics

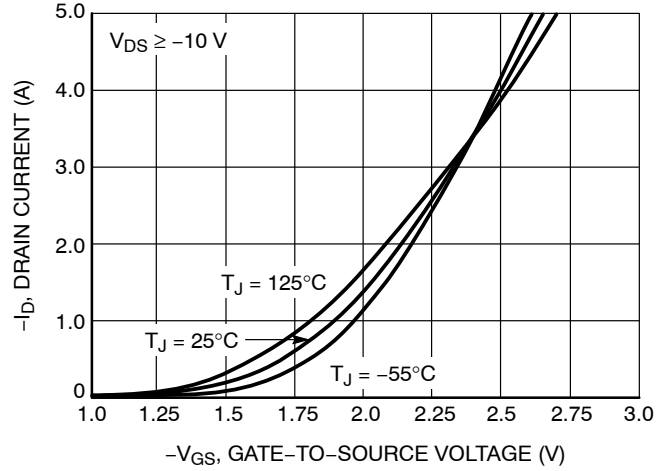


Figure 2. Transfer Characteristics

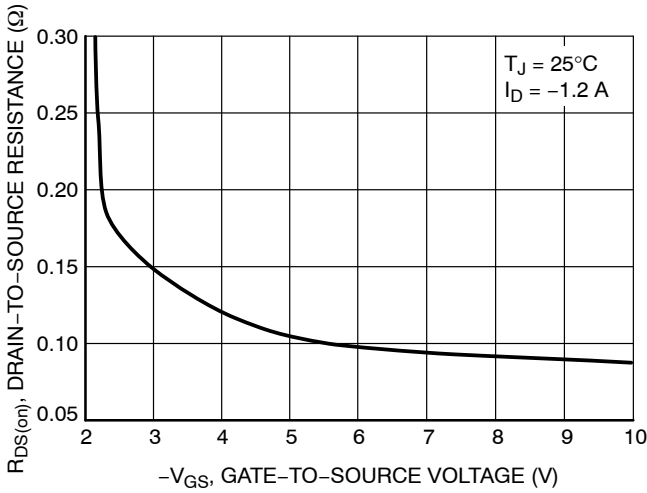


Figure 3. On-Resistance vs. Gate Voltage

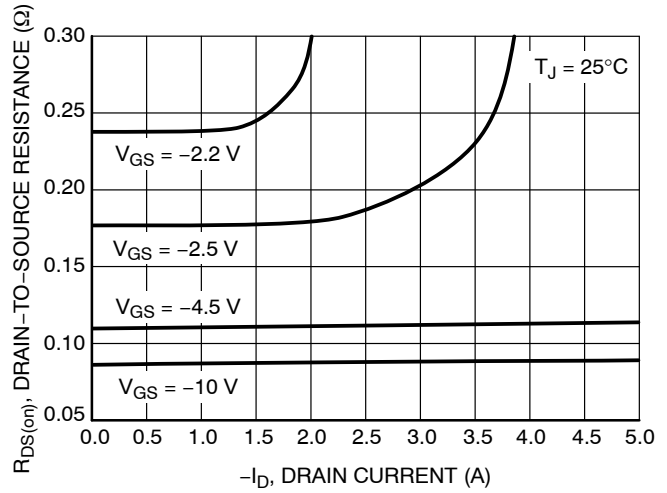


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

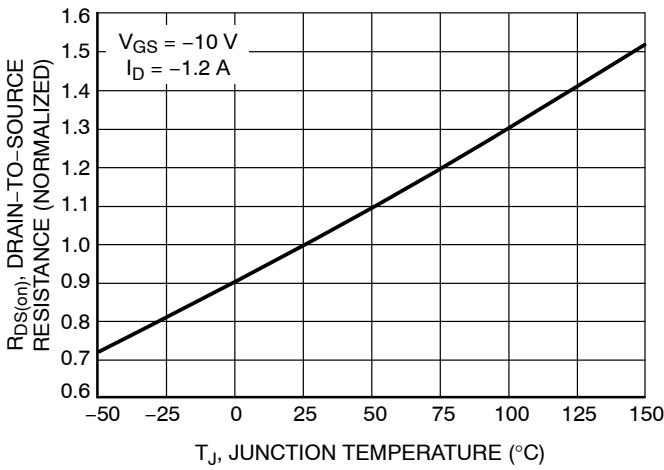


Figure 5. On-Resistance Variation with Temperature

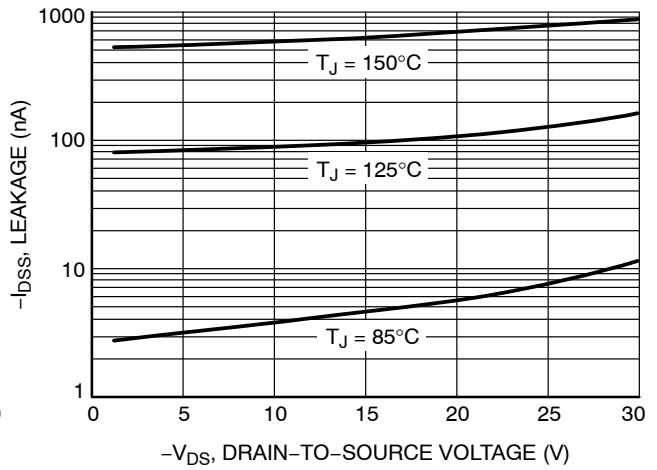


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

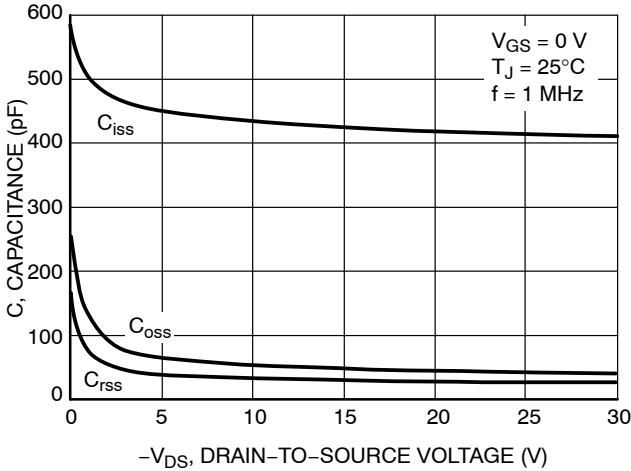


Figure 7. Capacitance Variation

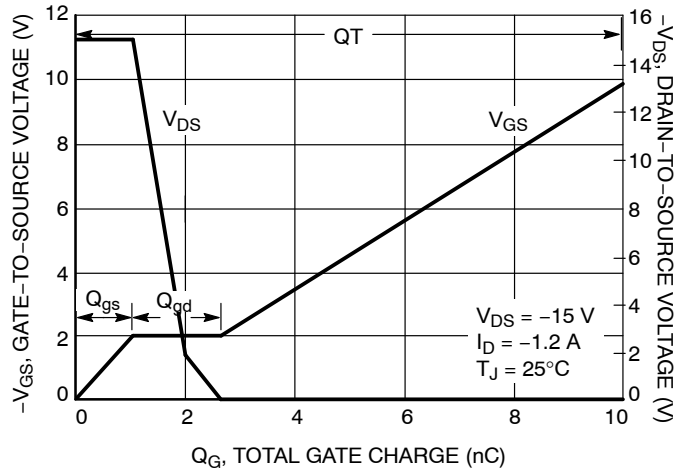


Figure 8. Gate-to-Source Voltage vs. Total Charge

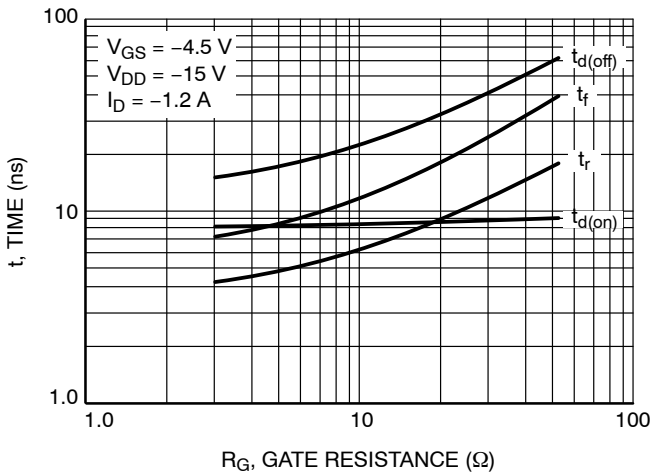


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

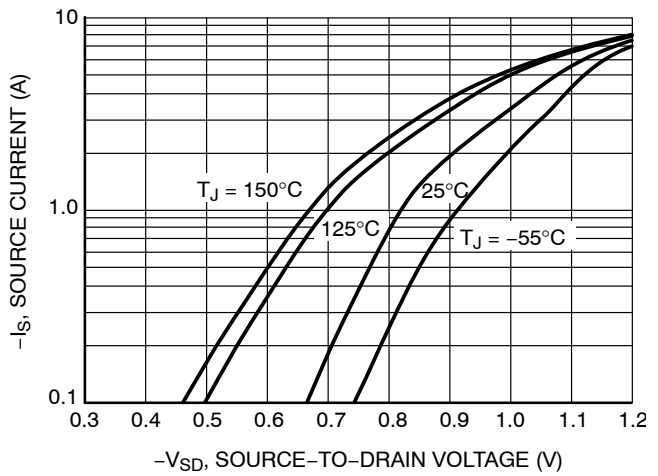


Figure 10. Diode Forward Voltage vs. Current

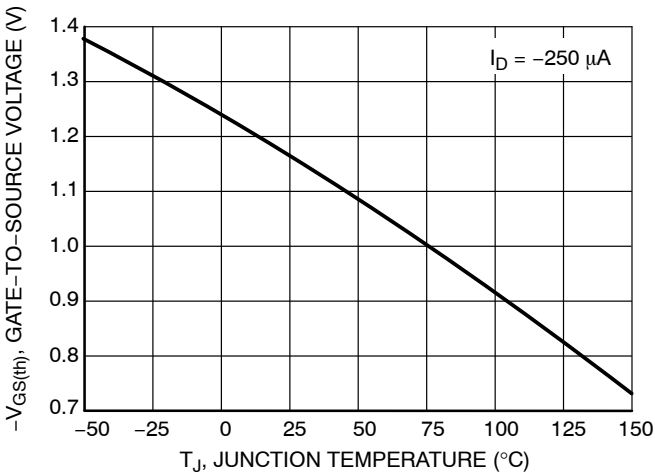


Figure 11. Threshold Voltage

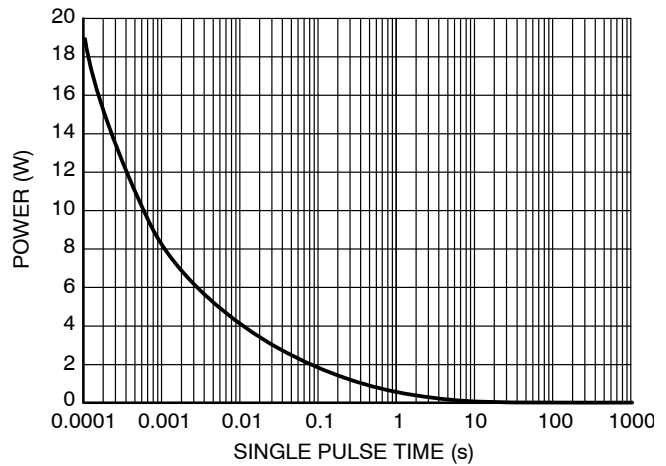


Figure 12. Single Pulse Maximum Power Dissipation

NTS4173P

TYPICAL PERFORMANCE CURVES

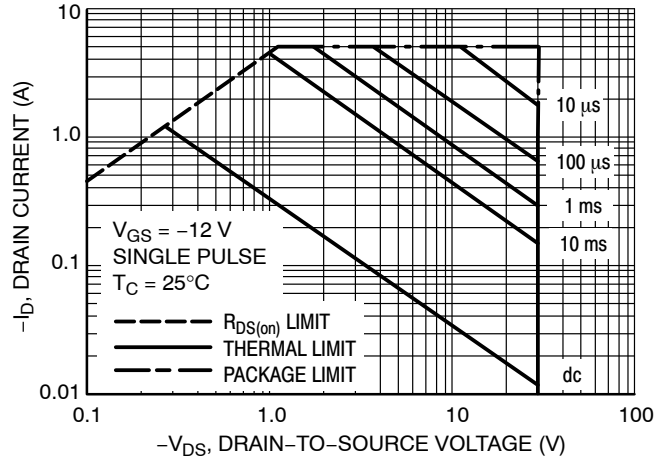


Figure 13. Maximum Rated Forward Biased Safe Operating Area

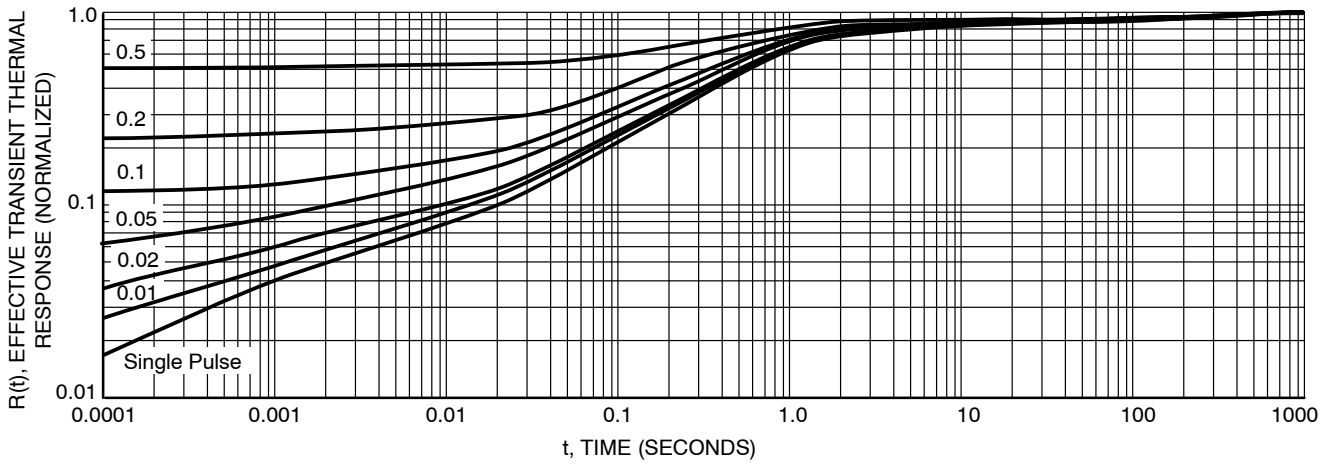
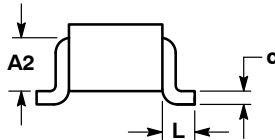
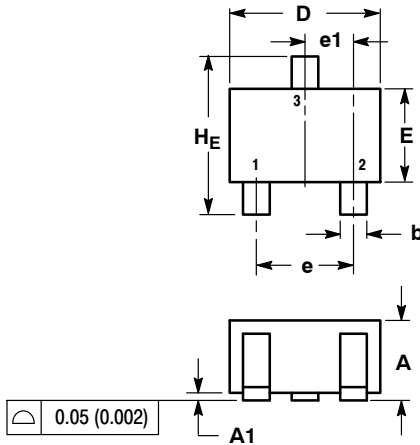


Figure 14. FET Thermal Response

NTS4173P

PACKAGE DIMENSIONS

SC-70 (SOT-323)
CASE 419-04
ISSUE M

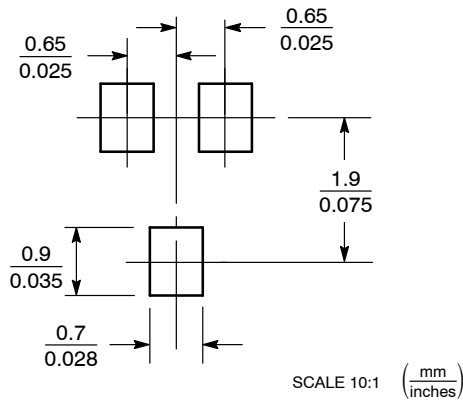


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | 0.90 | 1.00 | 0.032 | 0.035 | 0.040 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A2 | 0.7 REF | | | 0.028 REF | | |
| b | 0.30 | 0.35 | 0.40 | 0.012 | 0.014 | 0.016 |
| c | 0.10 | 0.18 | 0.25 | 0.004 | 0.007 | 0.010 |
| D | 1.80 | 2.10 | 2.20 | 0.071 | 0.083 | 0.087 |
| E | 1.15 | 1.24 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| e1 | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.425 REF | | | 0.017 REF | | |
| HE | 2.00 | 2.10 | 2.40 | 0.079 | 0.083 | 0.095 |

- STYLE B:
PIN 1. GATE
2. SOURCE
3. DRAIN

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.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local Sales Representative

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View NTS4173PT1G on WIN SOURCE](#)

 [ON Semiconductor](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management