# MOSFET – Single, N-Channel, Small Signal, SC-70

## 30 V, 270 mA

# NTS4001N, NVS4001N

| $V_{(BR)DSS}$ | $R_{DS(on)}$ TYP | $I_D$ Max |
|---|---|---|
| 30 V | 1.0 Ω @ 4.0 V | 270 mA |
| | 1.5 Ω @ 2.5 V | |

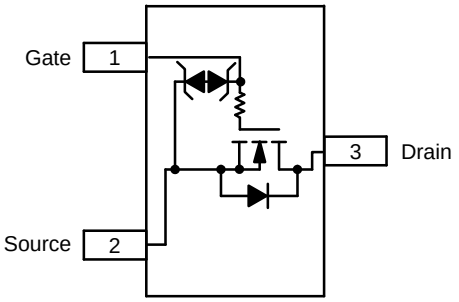
### Features

- Low Gate Charge for Fast Switching
- Small Footprint − 30% Smaller than TSOP-6
- ESD Protected Gate
- AEC-Q101 Qualified and PPAP Capable − NVS4001N
- These Devices are Pb-Free and are RoHS Compliant

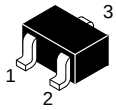
### Applications

- Low Side Load Switch
- Li-Ion Battery Supplied Devices − Cell Phones, PDAs, DSC
- Buck Converters
- Level Shifts

**SC-70/SOT-323 (3 LEADS)**

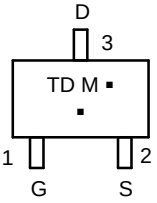



(Top View)




**SC-70 / SOT-323**
**CASE 419**
**STYLE 8**

**MARKING DIAGRAM & PIN ASSIGNMENT**




TD = Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

* Date Code orientation may vary depending upon manufacturing location.

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

| Parameter | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| 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 | $I_D$ | 270 | mA |
| | | $T_A$ = 85 °C | | 200 | |
| Power Dissipation (Note 1) | Steady State | $T_A$ = 25 °C | $P_D$ | 330 | mW |
| Pulsed Drain Current | | t =10 μs | $I_{DM}$ | 800 | mA |
| Operating Junction and Storage Temperature | | | $T_J$, $T_{STG}$ | −55 to 150 | °C |
| Source Current (Body Diode) | | | $I_S$ | 270 | mA |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | | $T_L$ | 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.

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

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| NTS4001NT1G | SC-70 (Pb-Free) | 3000 / Tape & Reel |
| NVS4001NT1G | 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.

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

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 100 μA | 30 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | | | 60 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 30 V | | | 1.0 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±10 V | | | ±1.0 | μA |
| **ON CHARACTERISTICS** (Note 2) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 100 μA | 0.8 | 1.2 | 1.5 | V |
| Gate Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | −3.4 | | mV/°C |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS}$ = 4.0 V, $I_D$ = 10 mA | | 1.0 | 1.5 | Ω |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 10 mA | | 1.5 | 2.0 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 3.0 V, $I_D$ = 10 mA | | 80 | | mS |
| **CHARGES AND CAPACITANCES** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1.0 MHz, $V_{DS}$ = 5.0 V | | 20 | 33 | pF |
| Output Capacitance | $C_{OSS}$ | | | 19 | 32 | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 7.25 | 12 | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = 5.0 V, $V_{DS}$ = 24 V, $I_D$ = 0.1 A | | 0.9 | 1.3 | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 0.2 | | |
| Gate-to-Source Charge | $Q_{GS}$ | | | 0.3 | | |
| Gate-to-Drain Charge | $Q_{GD}$ | | | 0.2 | | |
| **SWITCHING CHARACTERISTICS** (Note 3) | | | | | | |
| Turn-On Delay Time | $td_{(ON)}$ | $V_{GS}$ = 4.5 V, $V_{DD}$ = 5.0 V, $I_D$ = 10 mA, $R_G$ = 50 Ω | | 17 | | ns |
| Rise Time | tr | | | 23 | | |
| Turn-Off Delay Time | $td_{(OFF)}$ | | | 94 | | |
| Fall Time | tf | | | 82 | | |
| **DRAIN-SOURCE DIODE CHARACTERISTICS** | | | | | | |
| Forward Diode Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = 10 mA, $T_J$ = 25 °C | | 0.65 | 0.7 | V |
| | | $V_{GS}$ = 0 V, $I_S$ = 10 mA, $T_J$ = 125 °C | | 0.43 | | |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, $dI_S/dt$ = 8.0 A/μs, $I_S$ = 10 mA | | 5.0 | | ns |

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.

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



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## TYPICAL PERFORMANCE CURVES ($T_J$ = 25 °C unless otherwise noted)

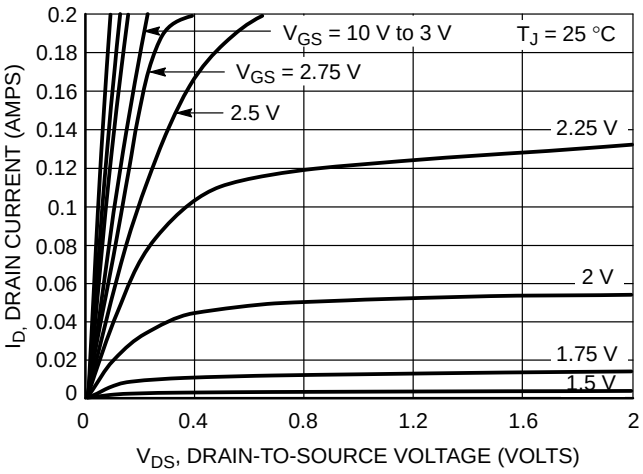


**Figure 1. On-Region Characteristics**

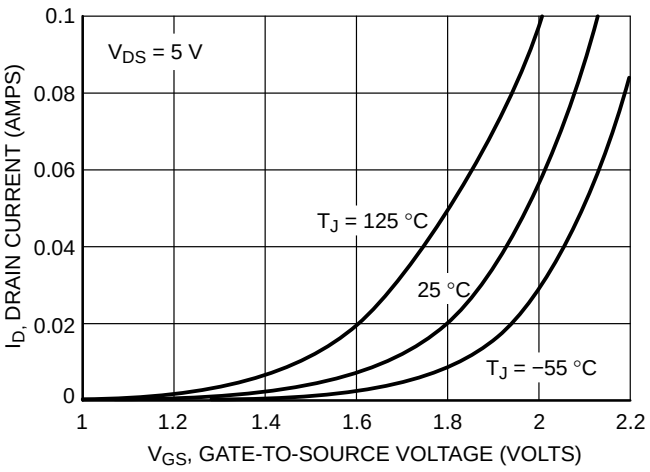


**Figure 2. Transfer Characteristics**

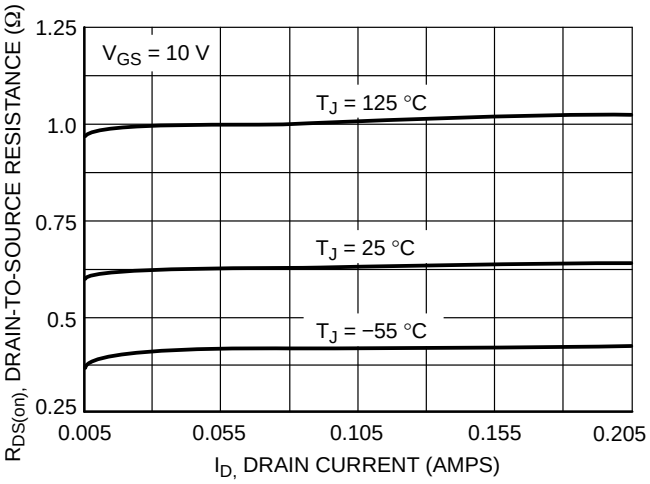


**Figure 3. On-Resistance vs. Drain Current and Temperature**

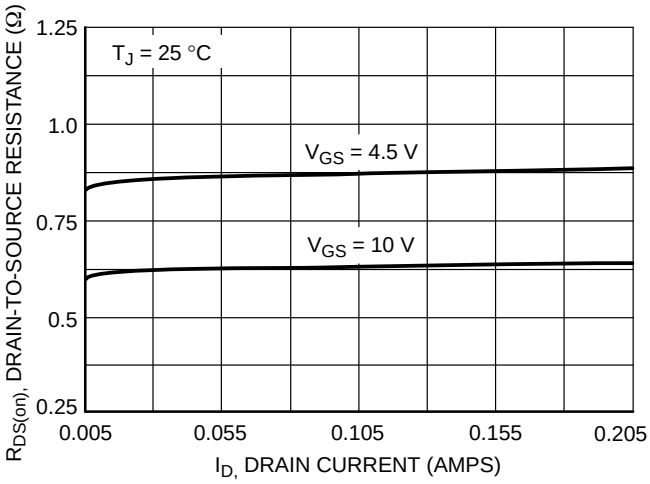


**Figure 4. On-Resistance vs. Drain Current and Gate Voltage**

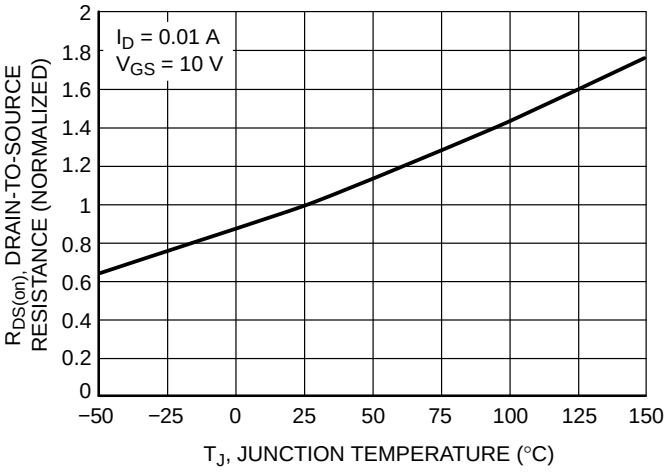


**Figure 5. On-Resistance Variation with Temperature**

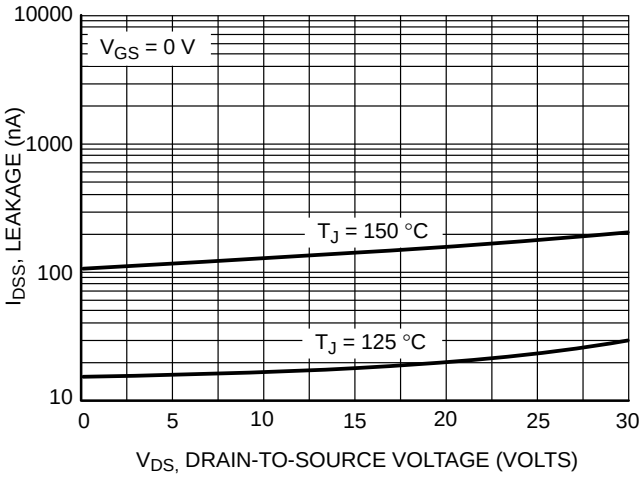


**Figure 6. Drain-to-Source Leakage Current vs. Voltage**



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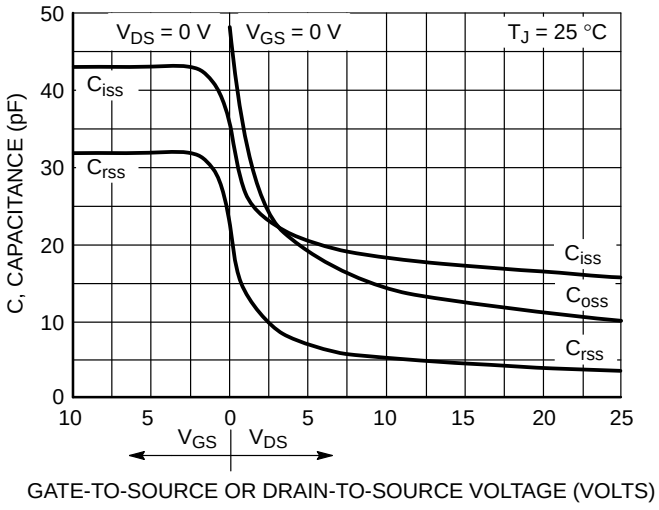


**Figure 7. Capacitance Variation**

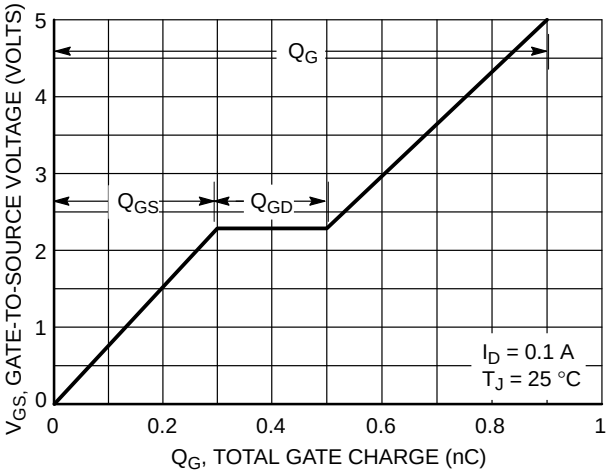


**Figure 8. Gate-to-Source Voltage vs. Total Gate Charge**

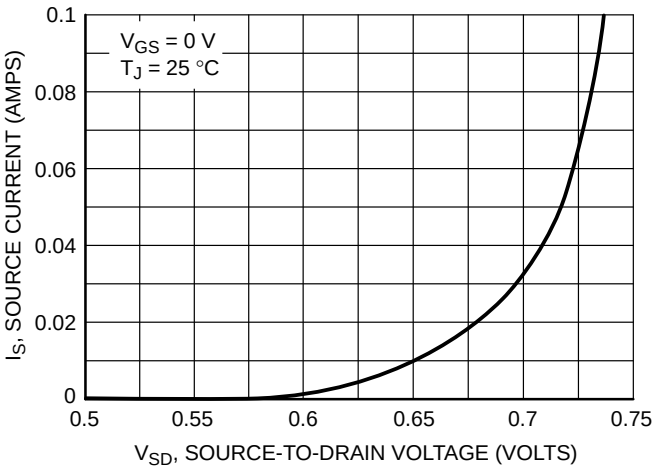


**Figure 9. Diode Forward Voltage vs. Current**



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## REVISION HISTORY

| Revision | Description of Changes | Date |
|---|---|---|
| 6 | Rebranded the document to **onsemi** format. | 2/3/2026 |

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



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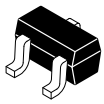
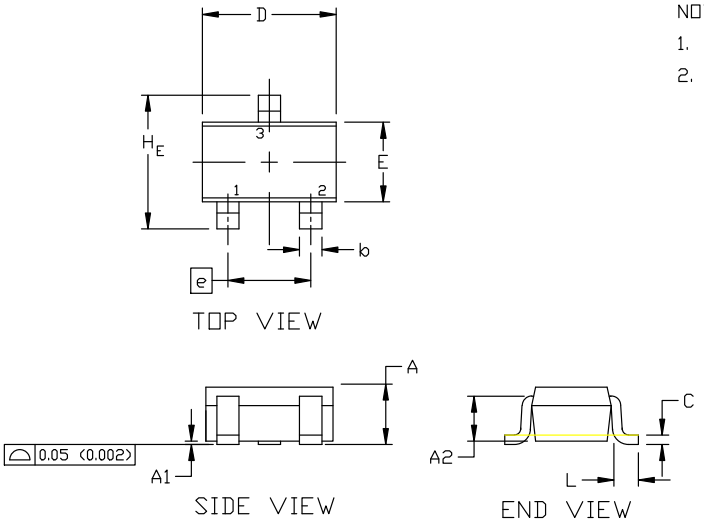


**SCALE 4:1**

**SC−70 (SOT−323)**
CASE 419
ISSUE R

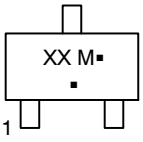
DATE 11 OCT 2022




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

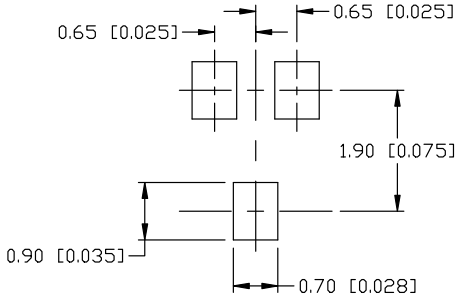
| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.80 | 0.90 | 1.00 | 0.032 | 0.035 | 0.040 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A2 | 0.70 REF | | | 0.028 BSC | | |
| b | 0.30 | 0.35 | 0.40 | 0.012 | 0.014 | 0.016 |
| c | 0.10 | 0.18 | 0.25 | 0.004 | 0.007 | 0.010 |
| D | 1.80 | 2.00 | 2.20 | 0.071 | 0.080 | 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 | 0.20 | 0.38 | 0.56 | 0.008 | 0.015 | 0.022 |
| $H_E$ | 2.00 | 2.10 | 2.40 | 0.079 | 0.083 | 0.095 |

## GENERIC MARKING DIAGRAM




XX = Specific Device Code
M = Date Code
▪ = 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.




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

SOLDERING FOOTPRINT

STYLE 1: CANCELLED

STYLE 2: PIN 1. ANODE 2. N.C. 3. CATHODE

STYLE 3: PIN 1. BASE 2. EMITTER 3. COLLECTOR

STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE

STYLE 5: PIN 1. ANODE 2. ANODE 3. CATHODE

STYLE 6: PIN 1. EMITTER 2. BASE 3. COLLECTOR

STYLE 7: PIN 1. BASE 2. EMITTER 3. COLLECTOR

STYLE 8: PIN 1. GATE 2. SOURCE 3. DRAIN

STYLE 9: PIN 1. ANODE 2. CATHODE 3. CATHODE−ANODE

STYLE 10: PIN 1. CATHODE 2. ANODE 3. ANODE−CATHODE

STYLE 11: PIN 1. CATHODE 2. CATHODE 3. CATHODE

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