

NTS4001N

Small Signal MOSFET

30 V, 270 mA, Single N-Channel, SC-70

Features

- Low Gate Charge for Fast Switching
- Small Footprint – 30% Smaller than TSOP-6
- ESD Protected Gate
- Pb-Free Package for Green Manufacturing (G Suffix)

Applications

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

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

| Parameter | | | Symbol | Value | Units |
|---|--------------|--------------------------|----------------|------------|------------------|
| Drain-to-Source Voltage | | | V_{DS} | 30 | V |
| Gate-to-Source Voltage | | | V_{GS} | ± 20 | V |
| Continuous Drain Current (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | I_D | 270 | mA |
| | | $T_A = 85^\circ\text{C}$ | | 200 | |
| Power Dissipation (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | P_D | 330 | mW |
| Pulsed Drain Current | | $t = 10 \mu\text{s}$ | I_{DM} | 200 | mA |
| Operating Junction and Storage Temperature | | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |
| Source Current (Body Diode) | | | I_S | 270 | mA |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | | T_L | 260 | $^\circ\text{C}$ |

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

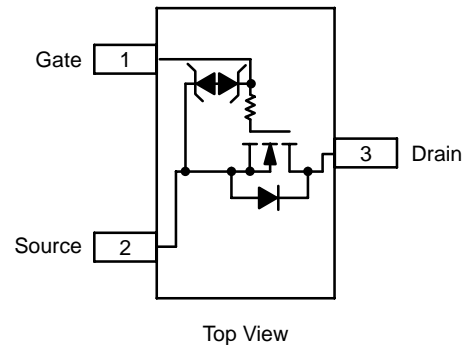


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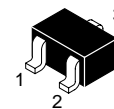
<http://onsemi.com>

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

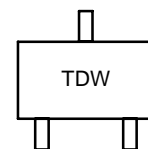
SC-70
SOT-323 (3 LEADS)



MARKING DIAGRAM

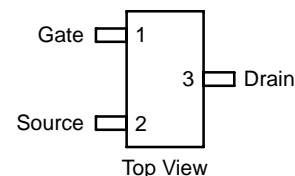


SC-70 / SOT-323
CASE 419
STYLE 8



TD = Device Code
W = Work Week

PIN ASSIGNMENT



ORDERING INFORMATION

| Device | Package | Shipping |
|-------------|--------------------|-----------------|
| NTS4001NT1 | SC-70 | 3000 Units/Reel |
| NTS4001NT1G | SC-70 (Pb-Free) | 3000 Units/Reel |

NTS4001N

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 | t _{d(ON)} | V _{GS} = 4.5 V, V _{DD} = 5.0 V, I _D = 10 mA, R _G = 50 Ω | | 17 | | ns |
| Rise Time | t _r | | | 23 | | |
| Turn-Off Delay Time | t _{d(OFF)} | | | 94 | | |
| Fall Time | t _f | | | 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 |
| | | | 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 |

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

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

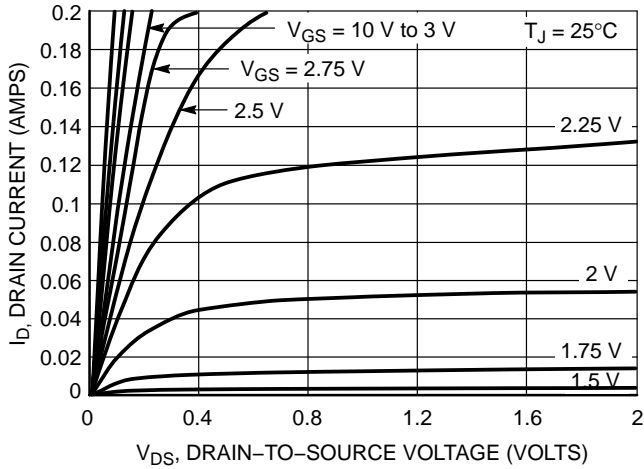


Figure 1. On-Region Characteristics

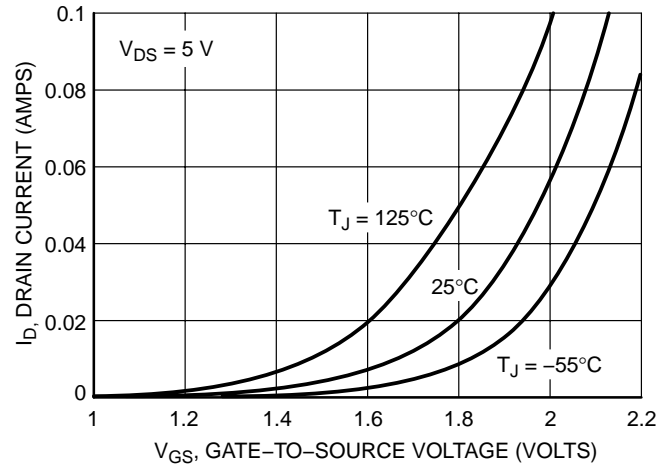


Figure 2. Transfer Characteristics

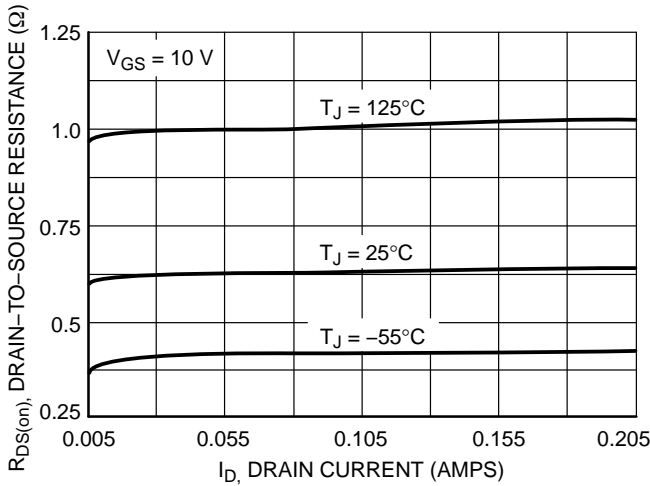


Figure 3. On-Resistance vs. Drain Current and Temperature

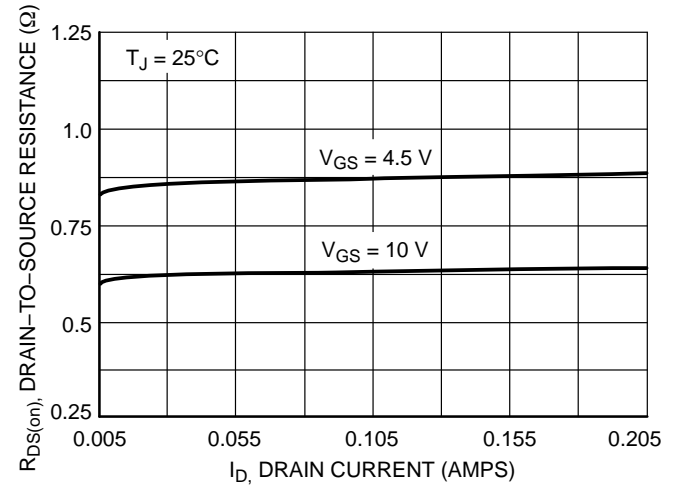


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

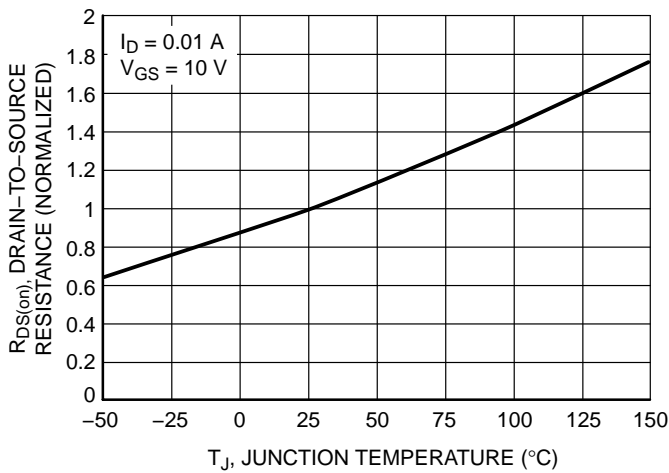


Figure 5. On-Resistance Variation with Temperature

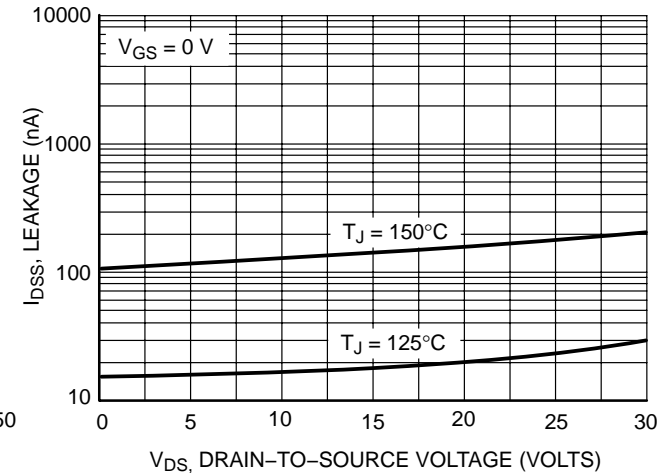
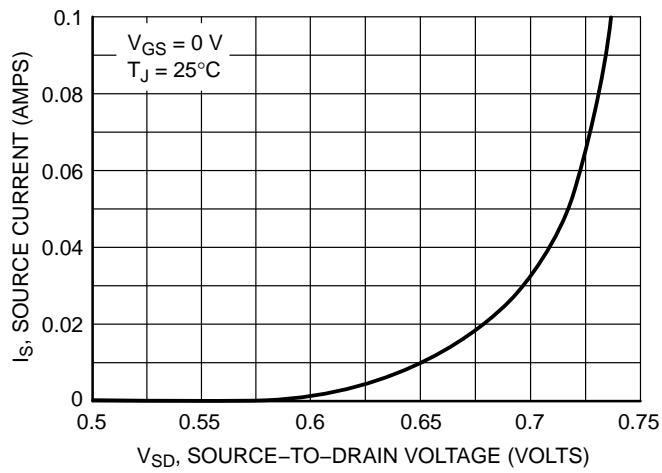
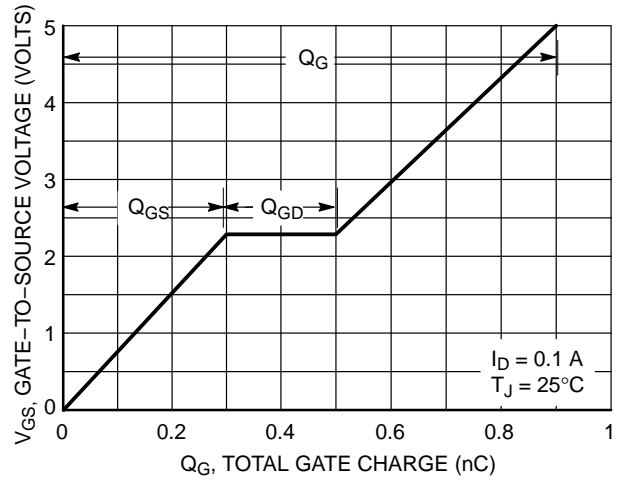
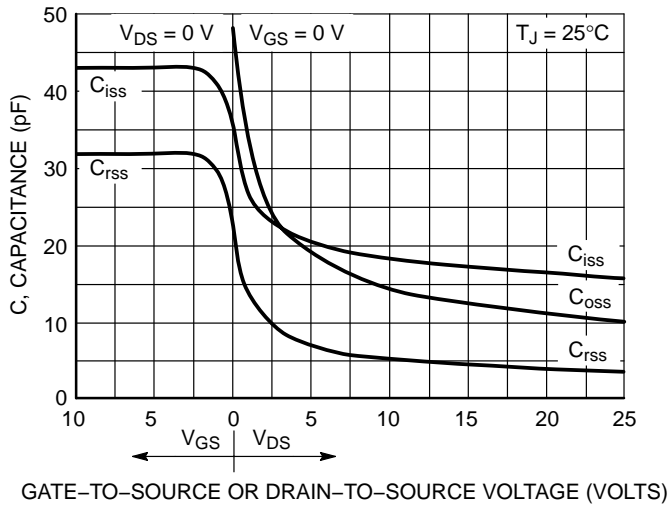


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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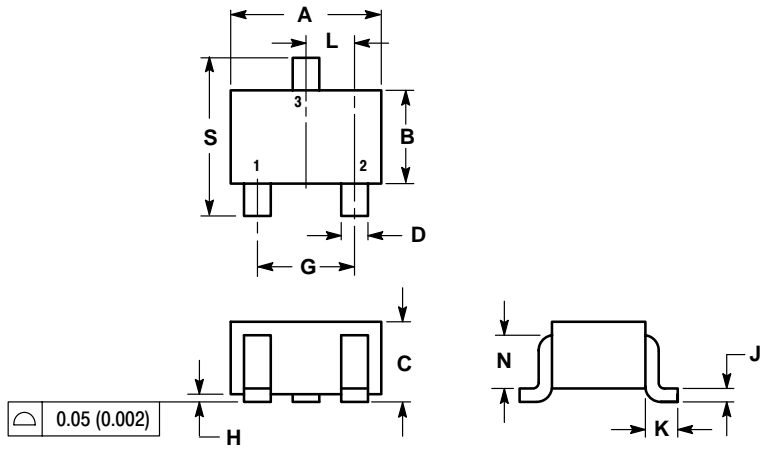
TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)



NTS4001N

PACKAGE DIMENSIONS

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



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

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.032 | 0.040 | 0.80 | 1.00 |
| D | 0.012 | 0.016 | 0.30 | 0.40 |
| G | 0.047 | 0.055 | 1.20 | 1.40 |
| H | 0.000 | 0.004 | 0.00 | 0.10 |
| J | 0.004 | 0.010 | 0.10 | 0.25 |
| K | 0.017 REF | | 0.425 REF | |
| L | 0.026 BSC | | 0.650 BSC | |
| N | 0.028 REF | | 0.700 REF | |
| S | 0.079 | 0.095 | 2.00 | 2.40 |

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

NTS4001N

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