

NTS4172N

Power MOSFET

30 V, 1.7 A, Single N-Channel, SC-70

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Halide Free
- This is a Pb-Free Device

Applications

- Low Side Load Switch
- DC-DC Converters (Buck and Boost Circuits)
- Optimized for Battery and Load Management Applications in Portable Equipment like Cell Phones, PDA's, Media Players, etc.

MAXIMUM RATINGS (T_J = 25°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 | I _D | T _A = 25°C | 1.6 | A |
| | | | T _A = 85°C | 1.13 | |
| | t ≤ 5 s | T _A = 25°C | 1.70 | | |
| Power Dissipation (Note 1) | Steady State | P _D | T _A = 25°C | 0.294 | W |
| | | | t ≤ 5 s | 0.350 | |
| Pulsed Drain Current | t _p = 10 μs | I _{DM} | 3.4 | A | |
| Operating Junction and Storage Temperature | | T _J , T _{stg} | -55 to 150 | °C | |
| Source Current (Body Diode) | | I _S | 0.25 | A | |
| 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.

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|------------------|-----|------|
| Junction-to-Ambient - Steady State (Note 1) | R _{θJA} | 425 | °C/W |
| Junction-to-Ambient - t ≤ 5 s (Note 1) | R _{θJA} | 360 | |

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

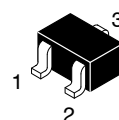
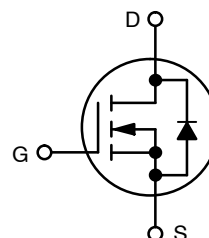


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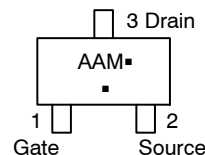
| V _{(BR)DSS} | R _{DS(on)} MAX | I _D MAX |
|----------------------|-------------------------|--------------------|
| 30 V | 93 mΩ @ 10 V | 1.7 A |
| | 100 mΩ @ 4.5 V | 1.5 A |
| | 140 mΩ @ 2.5 V | 1.0 A |

SC-70/SOT-323 (3 LEADS)



SC-70/SOT-323
CASE 419
STYLE 8

MARKING DIAGRAM/ PIN ASSIGNMENT



AA = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

* Date code orientation may vary depending upon manufacturing location

ORDERING INFORMATION

| Device | Package | Shipping† |
|-------------|-----------------|------------------|
| NTS4172NT1G | 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.

NTS4172N

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 |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | V _{(BR)DSS} / T _J | I _D = 250 μA, Reference to 25°C | | 8.4 | | mV/°C |
| 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 = 125°C | | | 1.0 5.0 | μA |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±12 V | | | ±100 | nA |

ON CHARACTERISTICS (Note 3)

| | | | | | | |
|--|--------------------------------------|---|-----|-----|-----|-------|
| Gate Threshold Voltage | V _{GS(TH)} | V _{GS} = V _{DS} , I _D = 250 μA | 0.6 | 1.0 | 1.4 | V |
| Negative Threshold Temperature Coefficient | V _{GS(TH)} / T _J | | | 3.1 | | mV/°C |
| Drain-to-Source On-Resistance | R _{DS(on)} | V _{GS} = 10 V, I _D = 1.7 A | | 58 | 93 | mΩ |
| | | V _{GS} = 4.5 V, I _D = 1.5 A | | 64 | 100 | |
| | | V _{GS} = 2.5 V, I _D = 1.0 A | | 79 | 140 | |
| Forward Transconductance | g _{FS} | V _{DS} = 5.0 V, I _D = 1.7 A | | 4.2 | | S |

CHARGES, CAPACITANCES AND GATE RESISTANCE

| | | | | | | |
|------------------------------|---------------------|--|--|------|--|----|
| Input Capacitance | C _{iss} | V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 15 V | | 381 | | pF |
| Output Capacitance | C _{oss} | | | 39.6 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 32.6 | | |
| Total Gate Charge | Q _{G(TOT)} | V _{GS} = 4.5 V, V _{DS} = 15 V, I _D = 1.7 A | | 4.38 | | nC |
| Threshold Gate Charge | Q _{G(TH)} | | | 0.40 | | |
| Gate-to-Source Charge | Q _{GS} | | | 0.62 | | |
| Gate-to-Drain Charge | Q _{GD} | | | 1.33 | | |
| Gate Resistance | R _G | | | 4.5 | | Ω |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|---------------------|--|--|------|--|----|
| Turn-On Delay Time | t _{d(on)} | V _{GS} = 4.5 V, V _{DD} = 15 V, I _D = 1.7 A, R _G = 3 Ω | | 7.5 | | ns |
| Rise Time | t _r | | | 4.4 | | |
| Turn-Off Delay Time | t _{d(off)} | | | 16.1 | | |
| Fall Time | t _f | | | 2.2 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|-------------------------|-----------------|---|--|------|-----|----|
| Forward Diode Voltage | V _{SD} | V _{GS} = 0 V, I _S = 1.0 A | | 0.76 | 1.0 | V |
| Reverse Recovery Time | t _{RR} | V _{GS} = 0 V, I _S = 1.0 A, dI _{SD} /dt = 100 A/μs | | 7.9 | | ns |
| Charge Time | t _a | | | 5.0 | | |
| Discharge Time | t _b | | | 2.9 | | |
| Reverse Recovery Charge | Q _{RR} | | | 2.0 | | nC |

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

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%

4. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

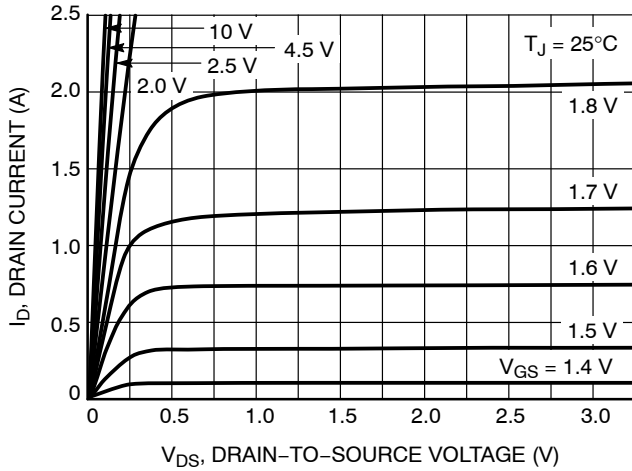


Figure 1. On-Region Characteristics

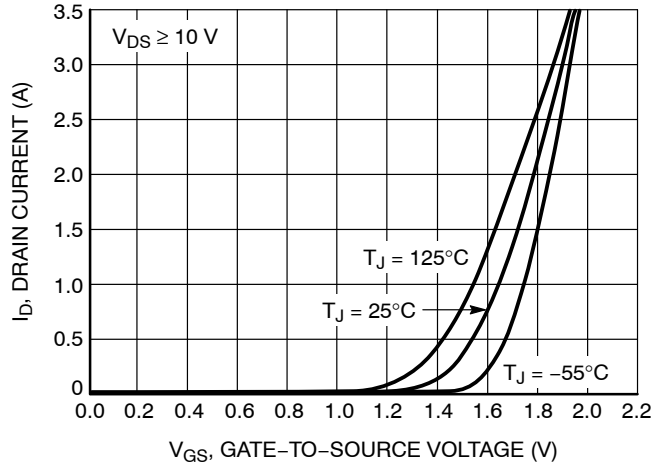


Figure 2. Transfer Characteristics

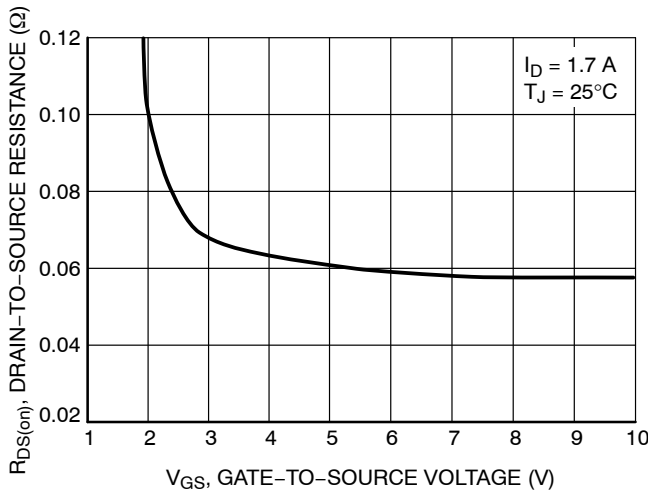


Figure 3. On-Resistance vs. Gate Voltage

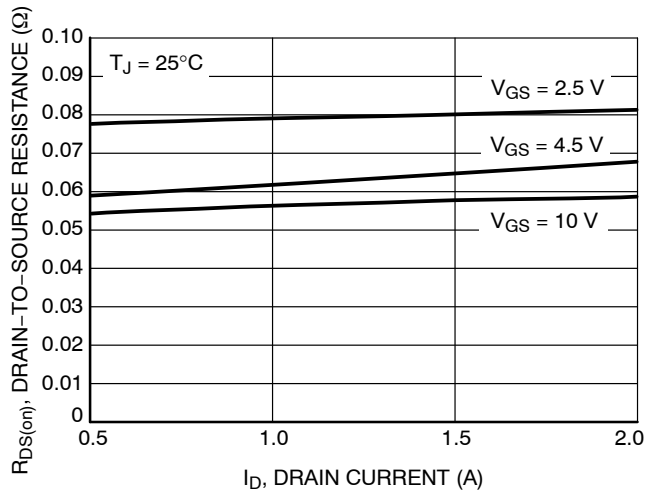


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

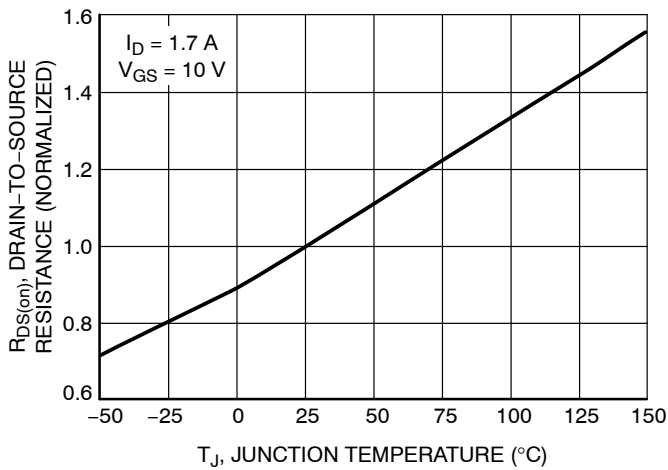


Figure 5. On-Resistance Variation with Temperature

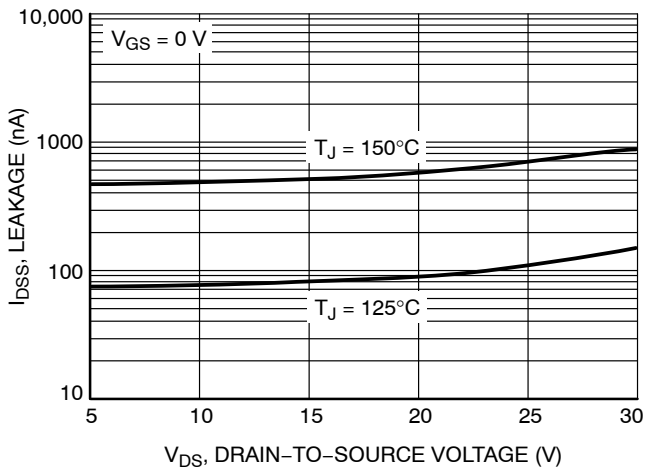


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

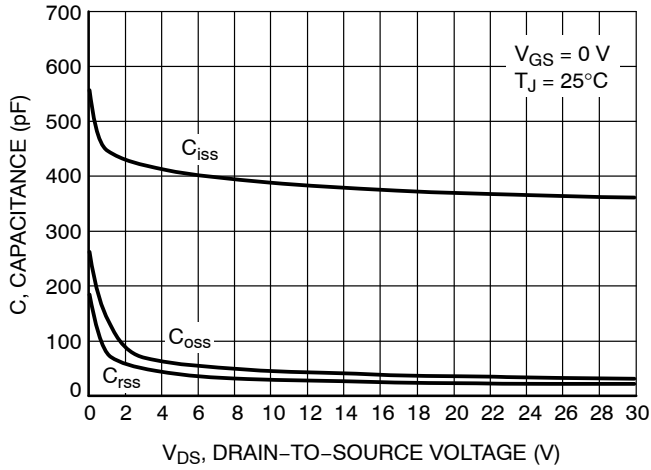


Figure 7. Capacitance Variation

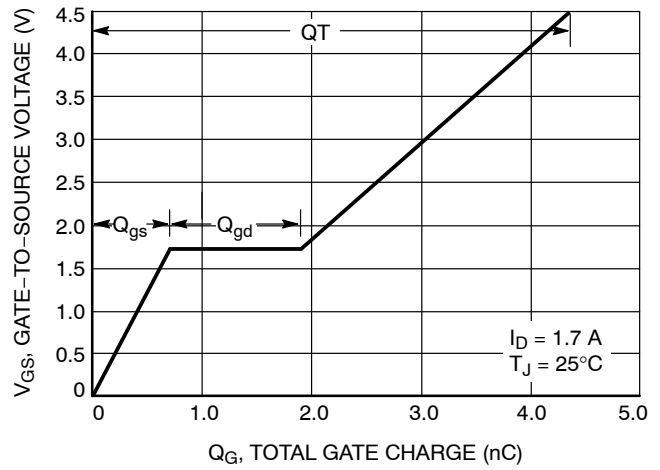


Figure 8. Gate-to-Source Voltage vs. Total Charge

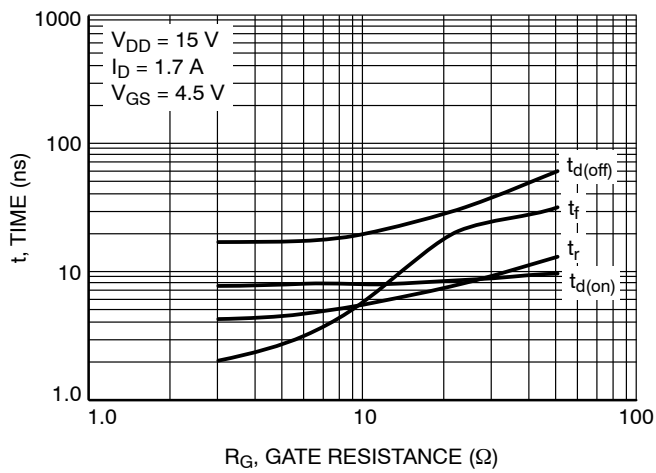


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

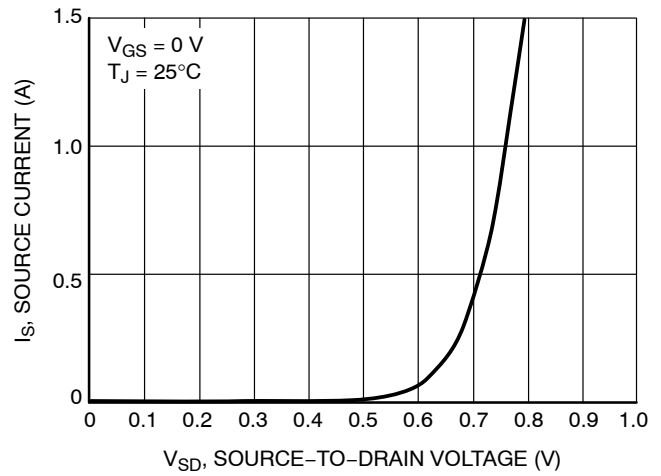


Figure 10. Diode Forward Voltage vs. Current

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



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

| 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 | 0.70 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 DN Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/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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