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[NTMS4107NR2G](#)

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NTMS4107N

Power MOSFET

30 V, 18 A, Single N-Channel, SO-8

Features

- Ultra Low $R_{DS(on)}$ (at 4.5 V_{GS}), Low Gate Resistance and Low Q_G
- Optimized for Low Side Synchronous Applications
- High Speed Switching Capability
- Pb-Free Package is Available

Applications

- Notebook Computer Vcore Applications
- Network Applications
- DC-DC Converters

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

| Rating | | 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 | I _D | T _A = 25°C | A |
| | | | T _A = 85°C | |
| | t ≤ 10 s | | T _A = 25°C | |
| Power Dissipation (Note 1) | Steady State | P _D | T _A = 25°C | W |
| | t ≤ 10 s | | | |
| Continuous Drain Current (Note 2) | Steady State | I _D | T _A = 25°C | A |
| | | | T _A = 85°C | |
| Power Dissipation (Note 2) | Steady State | P _D | T _A = 25°C | W |
| Pulsed Drain Current | t _p = 10 μs | I _{DM} | 56 | A |
| Operating Junction and Storage Temperature | | T _J , T _{stg} | -55 to 150 | °C |
| Continuous Source Current (Body Diode) | | I _S | 3.0 | A |
| Single Pulse Drain-to-Source Avalanche Energy (V _{DD} = 30 V, V _{GS} = 10 V, I _{PK} = 32 A, L = 1 mH, R _G = 25 Ω) | | E _{AS} | 512 | mJ |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | T _L | 260 | °C |

THERMAL RESISTANCE RATINGS

| Rating | Symbol | Max | Unit |
|---|------------------|-----|------|
| Junction-to-Ambient – Steady State (Note 1) | R _{θJA} | 75 | °C/W |
| Junction-to-Ambient – t ≤ 10 s (Note 1) | R _{θJA} | 50 | |
| Junction-to-Ambient – Steady State (Note 2) | R _{θJA} | 135 | |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

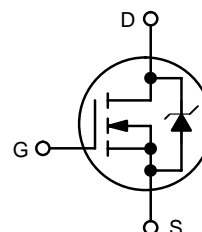
1. Surface-mounted on FR4 board using 1" sq. pad size (Cu area = 1.127" sq. [1 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size (Cu area = 0.412" sq.).



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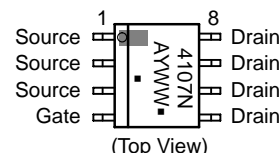
| V _{(BR)DSS} | R _{DS(on)} TYP | I _D MAX |
|----------------------|-------------------------|--------------------|
| 30 V | 3.4 mΩ @ 10 V | 18 A |
| | 4.7 mΩ @ 4.5 V | |



MARKING DIAGRAM/ PIN ASSIGNMENT



**SO-8
CASE 751
STYLE 12**



4107N = 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† |
|--------------|-------------------|------------------|
| NTMS4107NR2 | SO-8 | 2500/Tape & Reel |
| NTMS4107NR2G | SO-8 (Pb-Free) | 2500/Tape & 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.

NTMS4107N

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

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|----------------|--------|----------------|-----|-----|-----|------|
|----------------|--------|----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|---|-------------------|---|---------------------------|----|-----------|----------------------|
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 30 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | | | 21 | | mV/ $^\circ\text{C}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}$ | $T_J = 25^\circ\text{C}$ | | 1.0 | μA |
| | | | $T_J = 125^\circ\text{C}$ | | 10 | |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |

ON CHARACTERISTICS (Note 3)

| | | | | | | |
|--|------------------|---|-----|-----|-----|----------------------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$ | 1.0 | | 2.5 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | 7.4 | | mV/ $^\circ\text{C}$ |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}, I_D = 14\text{ A}$ | | 4.7 | 5.5 | m Ω |
| | | $V_{GS} = 10\text{ V}, I_D = 15\text{ A}$ | | 3.4 | 4.5 | |
| Forward Transconductance | g_{FS} | $V_{DS} = 15\text{ V}, I_D = 18\text{ A}$ | | 25 | | S |

CHARGES, CAPACITANCES AND GATE RESISTANCE

| | | | | | | |
|------------------------------|--------------|--|--|------|--|---------------|
| Input Capacitance | C_{ISS} | $V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 15\text{ V}$ | | 6000 | | μF |
| Output Capacitance | C_{OSS} | | | 1030 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 550 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 18\text{ A}$ | | 45 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 6.5 | | |
| Gate-to-Source Charge | Q_{GS} | | | 16.3 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 19.3 | | |
| Gate Resistance | R_G | | | 0.60 | | Ω |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|--------------|---|--|-----|--|-------------|
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}, I_D = 1.0\text{ A}, R_G = 6.0\text{ }\Omega$ | | 9.0 | | ns |
| Rise Time | t_r | | | 10 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 94 | | |
| Fall Time | t_f | | | 38 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-------------------------|----------|---|---------------------------|----|-----|-----|-------------|
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = 3.0\text{ A}$ | $T_J = 25^\circ\text{C}$ | | 0.8 | 1.1 | V |
| | | | $T_J = 125^\circ\text{C}$ | | 0.6 | | |
| Reverse Recovery Time | t_{RR} | $V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = 3.0\text{ A}$ | | 41 | | | ns |
| Charge Time | t_a | | | 20 | | | |
| Discharge Time | t_b | | | 21 | | | |
| Reverse Recovery Charge | Q_{RR} | | | 48 | | | nC |

3. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

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TYPICAL PERFORMANCE CURVES

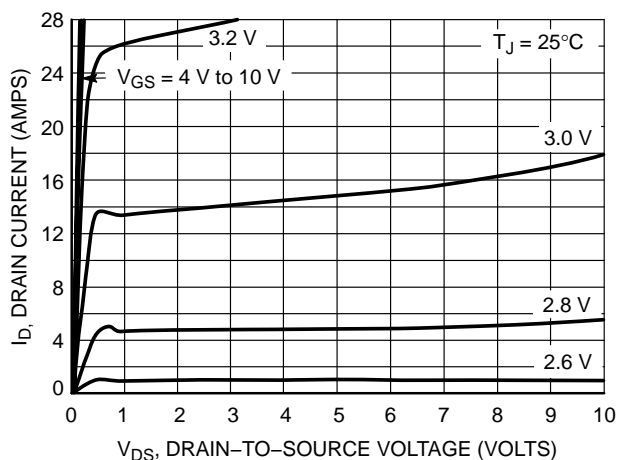


Figure 1. On-Region Characteristics

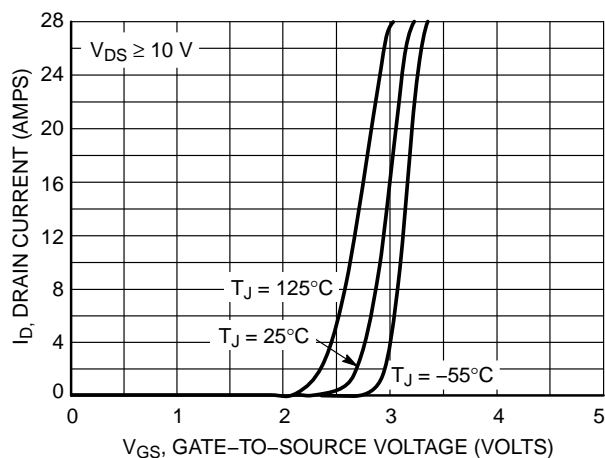


Figure 2. Transfer Characteristics

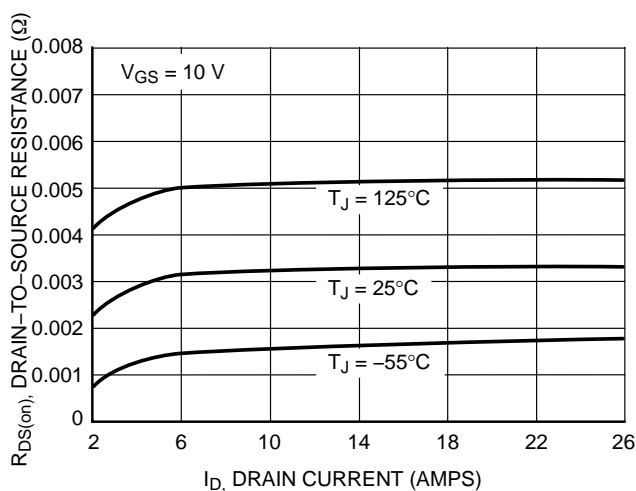


Figure 3. On-Resistance vs. Drain Current and Temperature

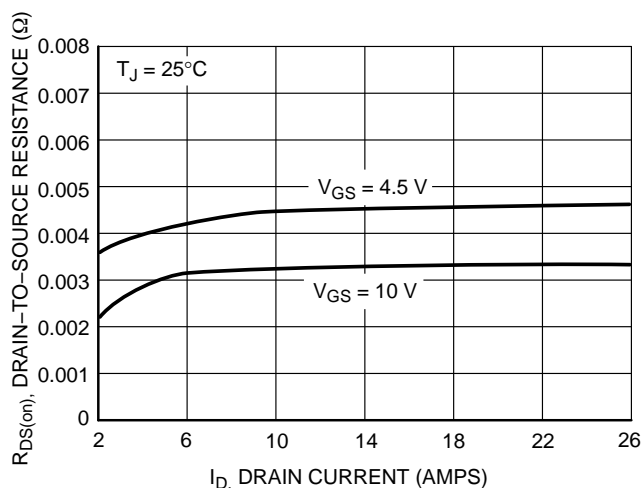


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

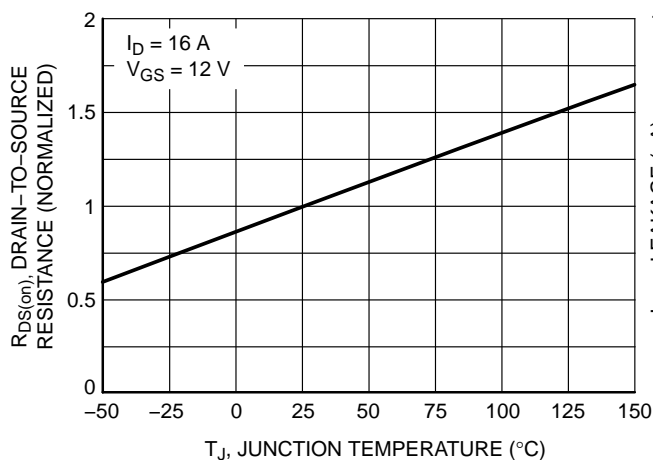


Figure 5. On-Resistance Variation with Temperature

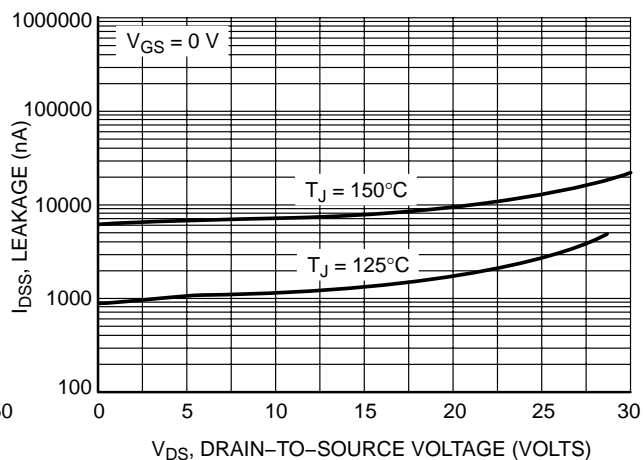


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES

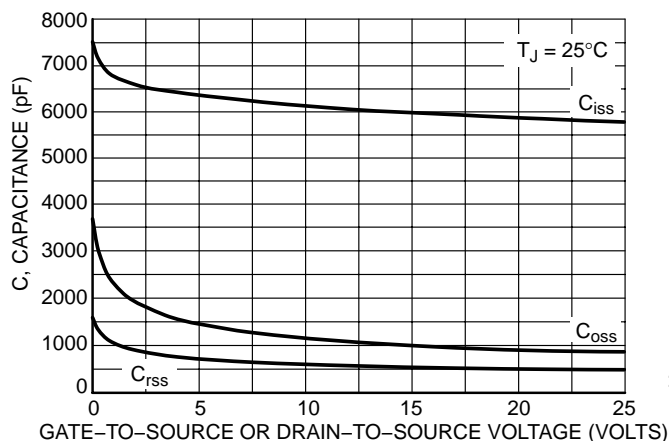


Figure 7. Capacitance Variation

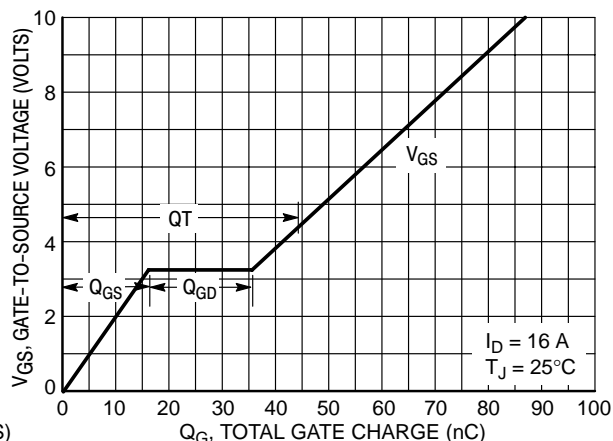


Figure 8. Gate-To-Source and Drain-To-Source Voltage vs. Total Charge

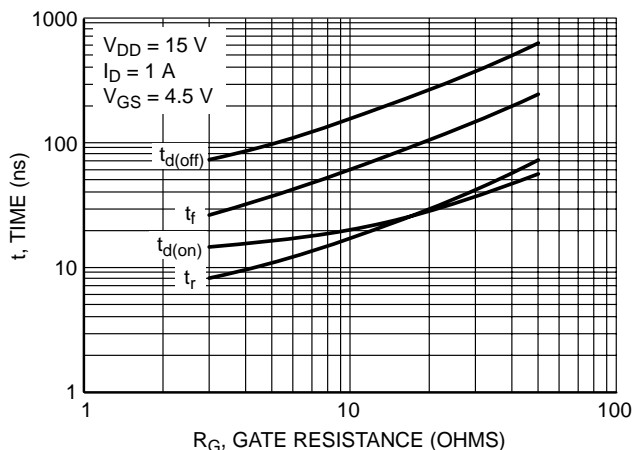


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

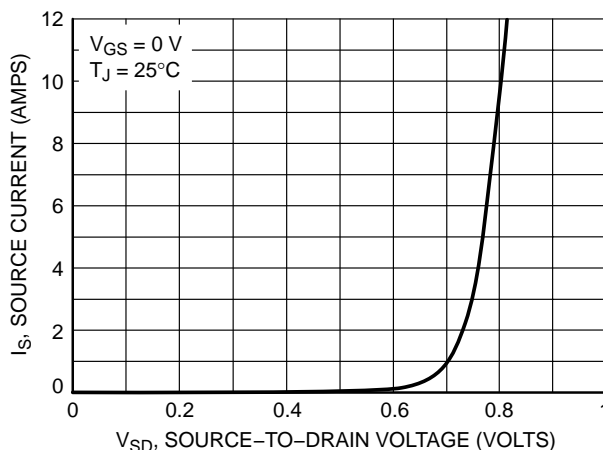


Figure 10. Diode Forward Voltage vs. Current

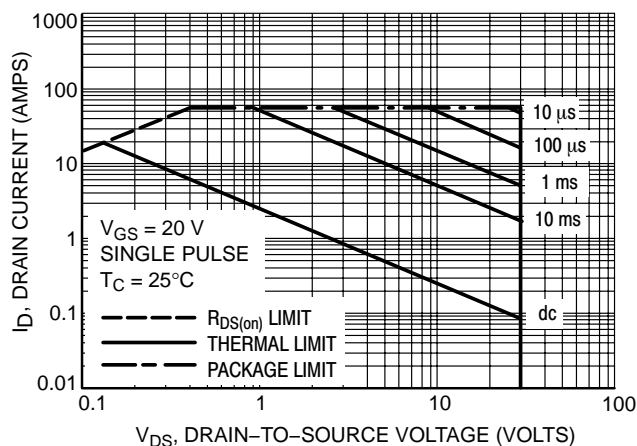
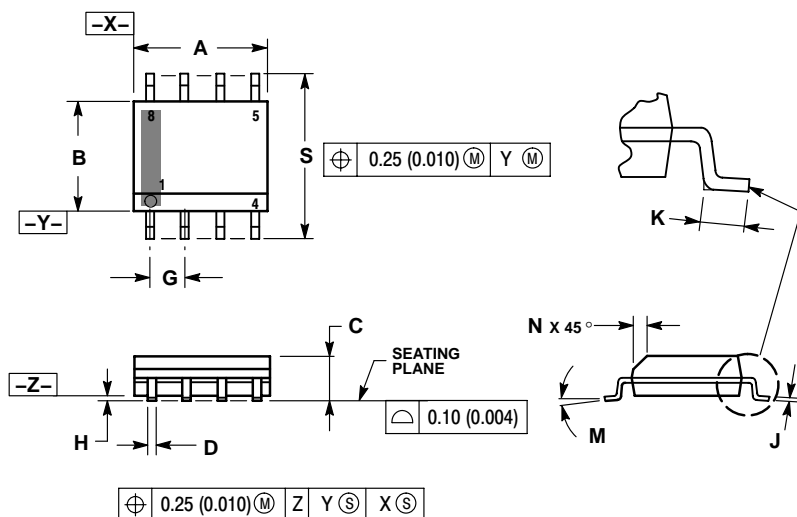


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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PACKAGE DIMENSIONS

SO-8
CASE 751-07
ISSUE AG



NOTES:

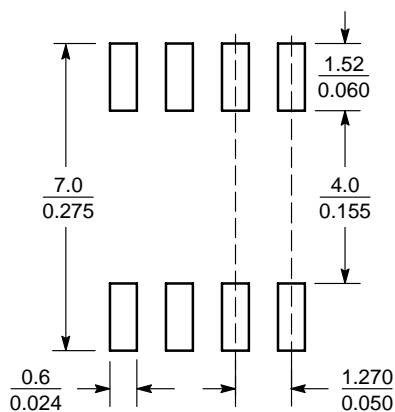
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.197 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.053 | 0.069 |
| D | 0.33 | 0.51 | 0.013 | 0.020 |
| G | 1.27 BSC | | 0.050 BSC | |
| H | 0.10 | 0.25 | 0.004 | 0.010 |
| J | 0.19 | 0.25 | 0.007 | 0.010 |
| K | 0.40 | 1.27 | 0.016 | 0.050 |
| M | 0 ° | 8 ° | 0 ° | 8 ° |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

STYLE 12:

- PIN 1: SOURCE
2: SOURCE
3: SOURCE
4: GATE
5: DRAIN
6: DRAIN
7: DRAIN
8: DRAIN


SOLDERING FOOTPRINT*



SCALE 6:1 (mm/inches)

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

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