

2N7000

Preferred Device

Small Signal MOSFET 200 mAmps, 60 Volts N-Channel TO-92

Features

- Pb-Free Packages are Available*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|-----------------------|----------------------|----------------------------|
| Drain Source Voltage | V_{DSS} | 60 | Vdc |
| Drain-Gate Voltage ($R_{GS} = 1.0 \text{ M}\Omega$) | V_{DGR} | 60 | Vdc |
| Gate-Source Voltage - Continuous - Non-repetitive ($t_p \leq 50 \mu\text{s}$) | V_{GS} V_{GSM} | ± 20 ± 40 | Vdc Vpk |
| Drain Current - Continuous - Pulsed | I_D I_{DM} | 200 500 | mAdc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 350 2.8 | mW mW/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-----|---------------------------|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 357 | $^\circ\text{C}/\text{W}$ |
| Maximum Lead Temperature for Soldering Purposes, 1/16" from case for 10 seconds | T_L | 300 | $^\circ\text{C}$ |



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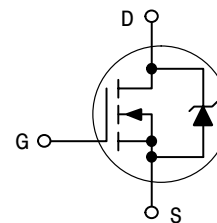
<http://onsemi.com>

200 mAmps

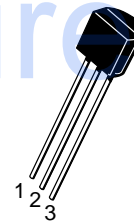
60 Volts

$R_{DS(on)} = 5 \Omega$

N-Channel

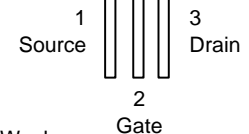


MARKING DIAGRAM & PIN ASSIGNMENT



TO-92
CASE 29
Style 22

2N7000
YWW



Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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

Preferred devices are recommended choices for future use and best overall value.

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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|---|----------------------|----|-----|--------------|
| Drain-Source Breakdown Voltage (V _{GS} = 0, I _D = 10 μAdc) | V _{(BR)DSS} | 60 | - | Vdc |
| Zero Gate Voltage Drain Current (V _{DS} = 48 Vdc, V _{GS} = 0) (V _{DS} = 48 Vdc, V _{GS} = 0, T _J = 125°C) | I _{DSS} | - | 1.0 | μAdc mAdc |
| Gate-Body Leakage Current, Forward (V _{GSF} = 15 Vdc, V _{DS} = 0) | I _{GSSF} | - | -10 | nAdc |

ON CHARACTERISTICS (Note 1)

| | | | | |
|--|---------------------|-----|-------------|-------|
| Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 1.0 mAdc) | V _{GS(th)} | 0.8 | 3.0 | Vdc |
| Static Drain-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 0.5 Adc) (V _{GS} = 4.5 Vdc, I _D = 75 mAdc) | r _{DS(on)} | - | 5.0 6.0 | Ohm |
| Drain-Source On-Voltage (V _{GS} = 10 Vdc, I _D = 0.5 Adc) (V _{GS} = 4.5 Vdc, I _D = 75 mAdc) | V _{DS(on)} | - | 2.5 0.45 | Vdc |
| On-State Drain Current (V _{GS} = 4.5 Vdc, V _{DS} = 10 Vdc) | I _{d(on)} | 75 | - | mAdc |
| Forward Transconductance (V _{DS} = 10 Vdc, I _D = 200 mAdc) | g _{fs} | 100 | - | μmhos |

DYNAMIC CHARACTERISTICS

| | | | | | |
|------------------------------|---|------------------|---|-----|----|
| Input Capacitance | (V _{DS} = 25 V, V _{GS} = 0, f = 1.0 MHz) | C _{iss} | - | 60 | pF |
| Output Capacitance | | C _{oss} | - | 25 | |
| Reverse Transfer Capacitance | | C _{rss} | - | 5.0 | |

SWITCHING CHARACTERISTICS (Note 1)

| | | | | | |
|---------------------|---|------------------|---|----|----|
| Turn-On Delay Time | (V _{DD} = 15 V, I _D = 500 mA, R _G = 25 Ω, R _L = 30 Ω, V _{gen} = 10 V) | t _{on} | - | 10 | ns |
| Turn-Off Delay Time | | t _{off} | - | 10 | |

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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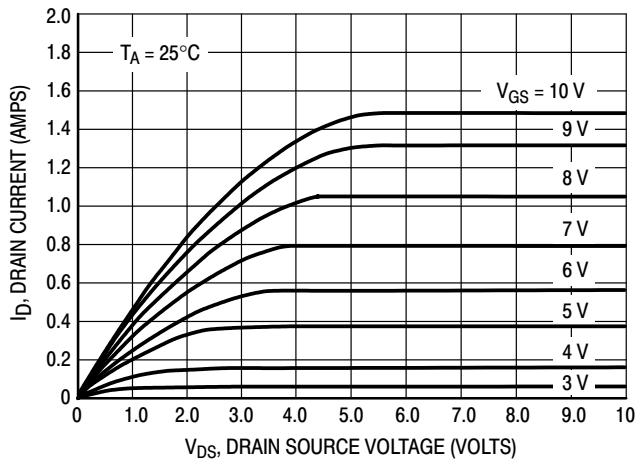


Figure 1. Ohmic Region

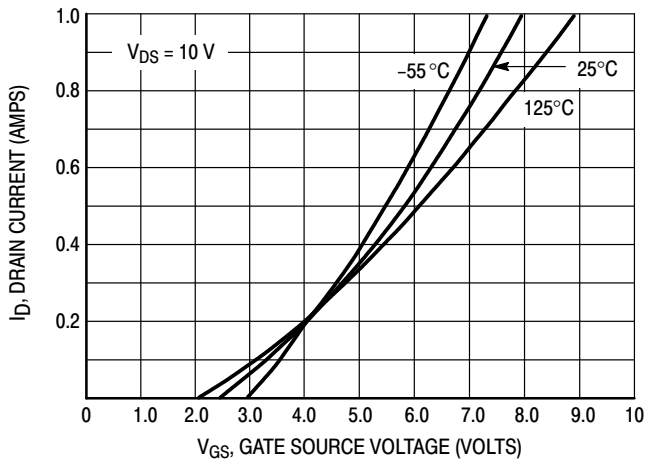


Figure 2. Transfer Characteristics

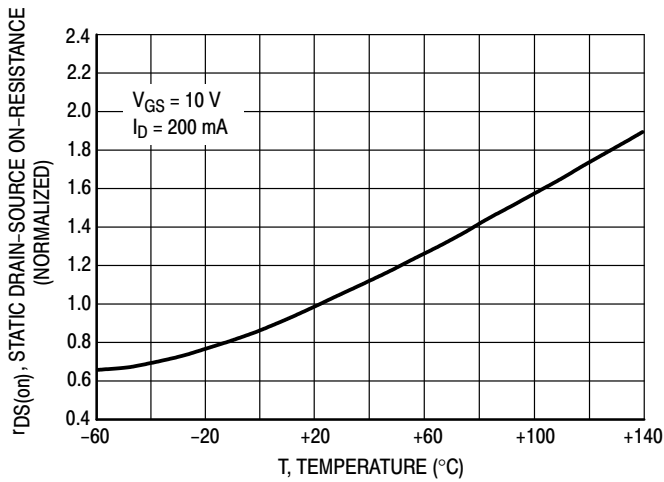


Figure 3. Temperature versus Static Drain-Source On-Resistance

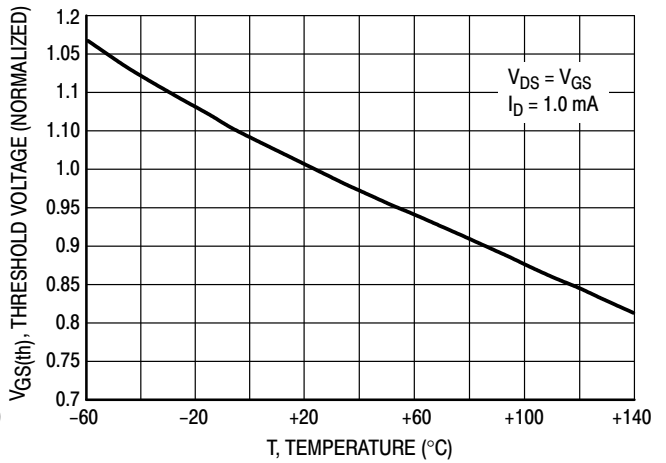


Figure 4. Temperature versus Gate Threshold Voltage

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ORDERING INFORMATION

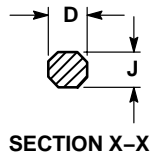
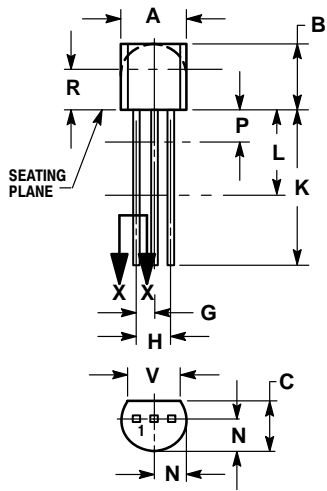
| Device | Package | Shipping† |
|-------------|--------------------|------------------|
| 2N7000 | TO-92 | 1000 Unit/Box |
| 2N7000G | TO-92 (Pb-Free) | 1000 Unit/Box |
| 2N7000RLRA | TO-92 | 2000 Tape & Reel |
| 2N7000RLRAG | TO-92 (Pb-Free) | 2000 Tape & Reel |
| 2N7000RLRM | TO-92 | 2000 Ammo Pack |
| 2N7000RLRMG | TO-92 (Pb-Free) | 2000 Ammo Pack |
| 2N7000RLRP | TO-92 | 2000 Ammo Pack |
| 2N7000RLRPG | TO-92 (Pb-Free) | 2000 Ammo Pack |
| 2N7000ZL1 | TO-92 | 2000 Ammo Pack |
| 2N7000ZL1G | TO-92 (Pb-Free) | 2000 Ammo Pack |

†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.

2N7000

PACKAGE DIMENSIONS

TO-92
CASE 29-11
ISSUE AL




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.021 | 0.407 | 0.533 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | --- | 12.70 | --- |
| L | 0.250 | --- | 6.35 | --- |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | --- | 0.100 | --- | 2.54 |
| R | 0.115 | --- | 2.93 | --- |
| V | 0.135 | --- | 3.43 | --- |

STYLE 22:

- PIN 1. SOURCE
2. GATE
3. DRAIN

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