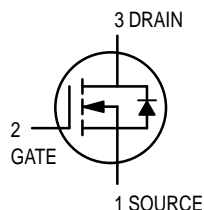


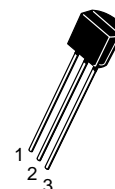
TMOS FET Transistor

N-Channel — Enhancement



2N7000

Motorola Preferred Device



CASE 29-04, STYLE 22
TO-92 (TO-226AA)

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 | $^\circ\text{C}$ |

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

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

OFF CHARACTERISTICS

| | | | | |
|--|---------------|--------|------------|-------------------------|
| Drain-Source Breakdown Voltage ($V_{GS} = 0, I_D = 10\ \mu\text{Adc}$) | $V_{(BR)DSS}$ | 60 | — | Vdc |
| Zero Gate Voltage Drain Current ($V_{DS} = 48\ \text{Vdc}, V_{GS} = 0$) ($V_{DS} = 48\ \text{Vdc}, V_{GS} = 0, T_J = 125^\circ\text{C}$) | I_{DSS} | — — | 1.0 1.0 | μAdc mAdc |
| Gate-Body Leakage Current, Forward ($V_{GSF} = 15\ \text{Vdc}, V_{DS} = 0$) | I_{GSSF} | — | -10 | nAdc |

ON CHARACTERISTICS(1)

| | | | | |
|--|--------------|--------|-------------|-----|
| Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1.0\ \text{mAdc}$) | $V_{GS(th)}$ | 0.8 | 3.0 | Vdc |
| Static Drain-Source On-Resistance ($V_{GS} = 10\ \text{Vdc}, I_D = 0.5\ \text{Adc}$) ($V_{GS} = 4.5\ \text{Vdc}, I_D = 75\ \text{mAdc}$) | $r_{DS(on)}$ | — — | 5.0 6.0 | Ohm |
| Drain-Source On-Voltage ($V_{GS} = 10\ \text{Vdc}, I_D = 0.5\ \text{Adc}$) ($V_{GS} = 4.5\ \text{Vdc}, I_D = 75\ \text{mAdc}$) | $V_{DS(on)}$ | — — | 2.5 0.45 | Vdc |

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

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

REV 3

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

| Characteristic | Symbol | Min | Max | Unit |
|--|-------------|-----|-----|------------------|
| ON CHARACTERISTICS(1) (continued) | | | | |
| On-State Drain Current ($V_{GS} = 4.5\text{ Vdc}$, $V_{DS} = 10\text{ Vdc}$) | $I_{d(on)}$ | 75 | — | mAdc |
| Forward Transconductance ($V_{DS} = 10\text{ Vdc}$, $I_D = 200\text{ mAdc}$) | g_{fs} | 100 | — | μmhos |

DYNAMIC CHARACTERISTICS

| | | | | | |
|------------------------------|---|-----------|---|-----|----|
| Input Capacitance | $(V_{DS} = 25\text{ V}, V_{GS} = 0,$ $f = 1.0\text{ MHz})$ | C_{iss} | — | 60 | pF |
| Output Capacitance | | C_{oss} | — | 25 | |
| Reverse Transfer Capacitance | | C_{rss} | — | 5.0 | |

SWITCHING CHARACTERISTICS(1)

| | | | | | |
|---------------------|--|-----------|---|----|----|
| Turn-On Delay Time | $(V_{DD} = 15\text{ V}, I_D = 500\text{ mA},$ $R_{gen} = 25\text{ ohms}, R_L = 25\text{ ohms})$ | t_{on} | — | 10 | ns |
| Turn-Off Delay Time | | t_{off} | — | 10 | |

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

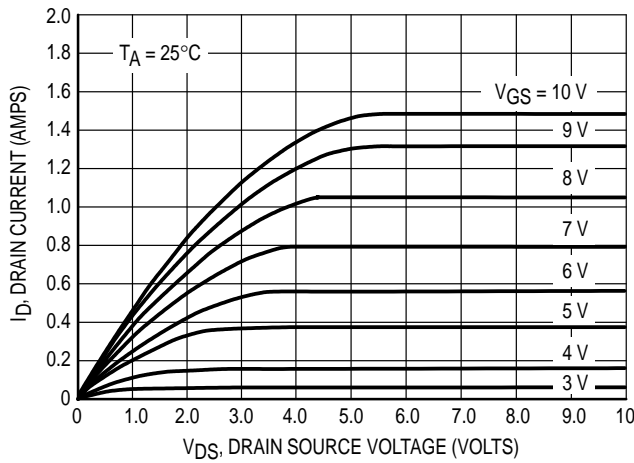


Figure 1. Ohmic Region

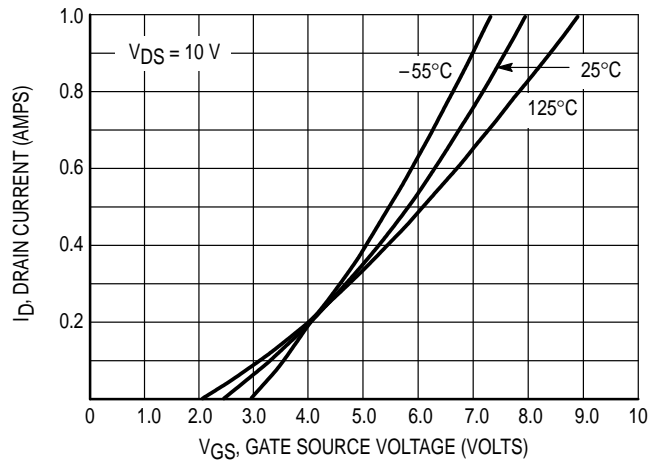


Figure 2. Transfer Characteristics

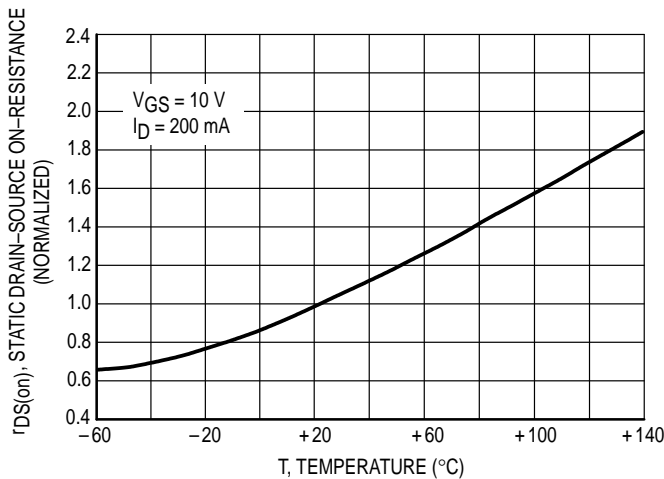


Figure 3. Temperature versus Static Drain-Source On-Resistance

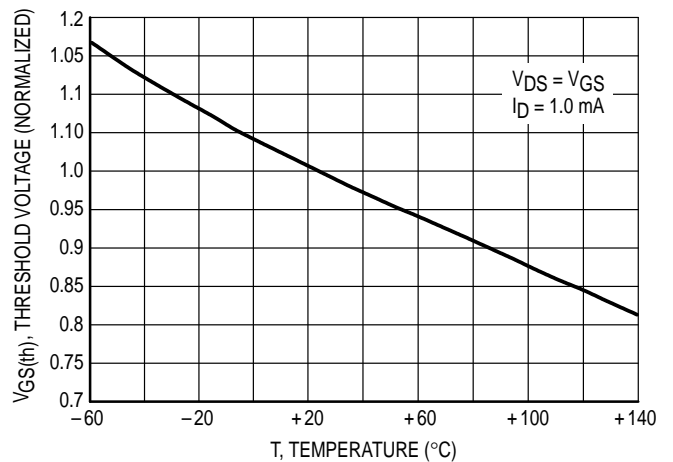
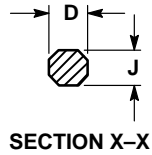
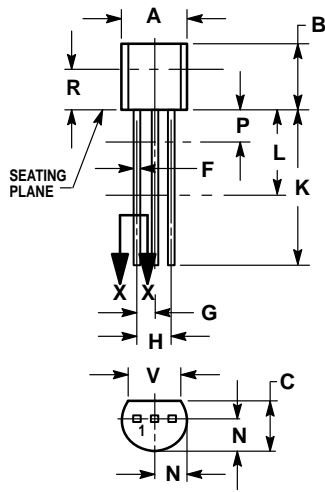


Figure 4. Temperature versus Gate Threshold Voltage

PACKAGE DIMENSIONS



**CASE 029-04
(TO-226AA)
ISSUE AD**


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K. MINIMUM 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 | 0.022 | 0.41 | 0.55 |
| F | 0.016 | 0.019 | 0.41 | 0.48 |
| 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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