

N-CHANNEL DEPLETION TYPE SILICON MOS FIELD-EFFECT TRANSISTOR

APPLICATIONS

- High and Low Frequency Amplifiers
- Ultra-High Input Impedance Amplifiers for such Circuits as:
 - Proximity Detectors
 - Smoke Detectors
 - Transducer Amplifiers
 - pH Detectors

PRINCIPAL DEVICES

2N3631 M100 M101

PACKAGE TYPE

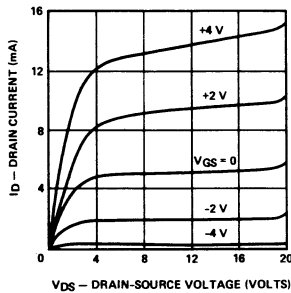
TO-18

FEATURES

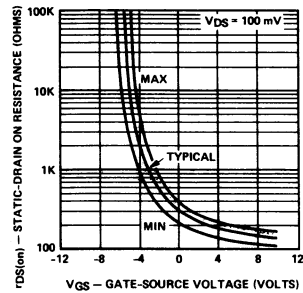
- No Gate Protective Diode Which Results In Ultra-High Input Impedance
- Ultra-Low Gate Leakage
- Normally ON

PERFORMANCE CURVES (25°C and $V_{BS} = 0$ unless otherwise noted)

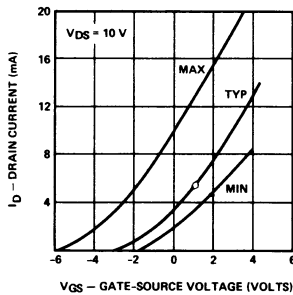
Output Characteristics



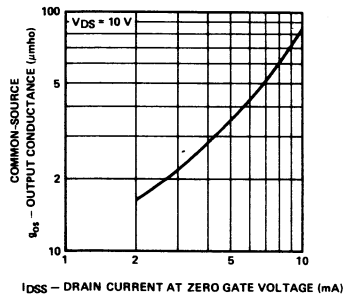
Drain-Source Static Resistance vs Gate-Source Bias



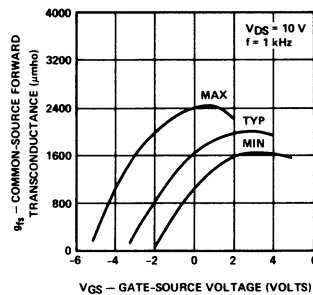
Transfer Characteristics



Output Conductance



Forward Transconductance vs Gate-Source Voltage



Performance Curves MB

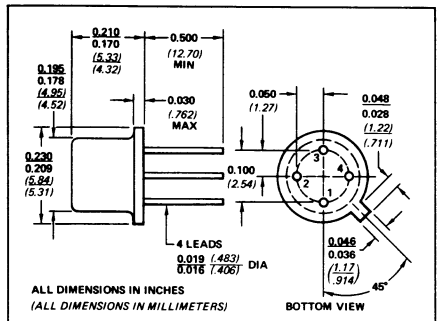
See Page 4-3



P-CHANNEL ENHANCEMENT-TYPE SILICON MOS FIELD-EFFECT TRANSISTOR

NORMALLY-OFF MOS FET FOR ANALOG AND DIGITAL SWITCHING APPLICATIONS

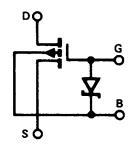
- Zener Clamp Protects the Gate
- Very Low $I_{D(off)}$ and $I_{S(off)}$



TO-72

ABSOLUTE MAXIMUM RATINGS (25°C)

| | |
|--|---------------|
| Drain-to-Source Voltage | -30 V |
| Gate-to-Source Voltage | -30 V |
| Gate-to-Drain Voltage | -30 V |
| Drain Current | -50 mA |
| Gate Current (Forward Direction for Zener Clamp) | +0.1 mA |
| Storage Temperature | -65 to +150°C |
| Operating Junction Temperature | -55 to +125°C |
| Total Device Dissipation (Derate 2.25 mW/°C to 125°C) | 225 mW |



| PIN | OUT |
|-----|------|
| 1 | D |
| 2 | G |
| 3 | B, C |
| 4 | S |

2

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

| Characteristic | | Min | Max | Unit | Test Conditions |
|---------------------------------|--|------|------|----------|--|
| S T A T I C | I_{GSS} Gate-Reverse Current | | -100 | pA | $V_{GS} = -20 V, V_{DS} = V_{BS} = 0$ |
| | BV_{GBS} Gate-Body Breakdown Voltage | -30 | -90 | V | $I_G = -10 \mu A, V_{SB} = V_{DB} = 0$ |
| | BV_{SDS} Source-Drain Breakdown Voltage | -30 | | | $I_S = -1 \mu A, V_{DG} = V_{BD} = 0$ |
| | BV_{DSS} Drain-Source Breakdown Voltage | -30 | | | $I_D = -1 \mu A, V_{GS} = V_{BS} = 0$ |
| | $V_{GS(th)}$ Gate Threshold Voltage | -2.5 | -5.5 | | $V_{GS} = V_{DS}, I_D = -10 \mu A, V_{BS} = 0$ |
| | $I_{S(off)}$ Source Cutoff Current | | -0.2 | nA | $V_{SD} = -20 V, V_{GD} = V_{BD} = 0$ |
| | $I_{D(off)}$ Drain Cutoff Current | | -0.2 | nA | $V_{DS} = -20 V, V_{GS} = V_{BS} = 0$ |
| D Y N A M I C | $r_{DS(on)}$ Drain Source ON Resistance | | 130 | Ω | $V_{GS} = -15 V, I_D = -100 \mu A, V_{BS} = 0$ |
| | | | 100 | | $V_{GS} = -20 V, I_D = -100 \mu A, V_{BS} = 0$ |
| D Y N A M I C | C_{gs} or C_{gd} Gate-Source or Gate-Drain Capacitance | | 4 | pF | $V_{GB} = V_{DB} = V_{SB} = 0$ Body Guarded |
| | C_{sb} Source-Body Capacitance | | 5 | | $V_{GB} = 0, V_{DB} = V_{SB} = -5 V$ |
| | C_{db} Drain-Body Capacitance | | 4 | | $f = 1 \text{ MHz}$ |
| | C_{ds} Drain-Source Capacitance | | 0.5 | | |

MB

P-CHANNEL ENHANCEMENT-TYPE SILICON MOS FIELD-EFFECT TRANSISTOR

APPLICATIONS

- Audio and RF Amplifiers
- Analog Switches
- Logic Circuits
- Multiplexers

PRINCIPAL DEVICES

MEM511C M103

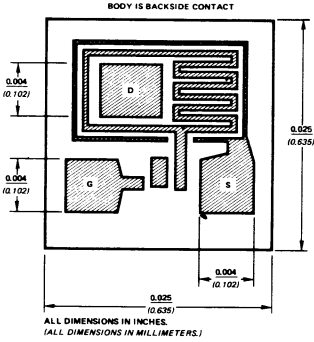
PACKAGE TYPE

TO-72

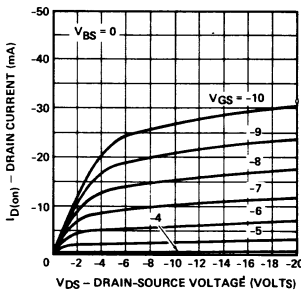
FEATURES

- 1010 Ω Input Resistance
- Integrated Zener Clamp Protects the Gate
- Source Law Transfer Characteristics
- Normally OFF
- Low $I_{D(off)}$ and $I_{S(off)}$

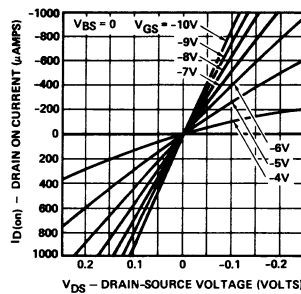
PERFORMANCE CURVES (25°C unless otherwise noted)



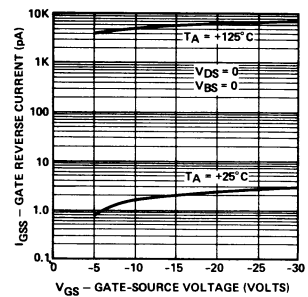
Output Characteristic



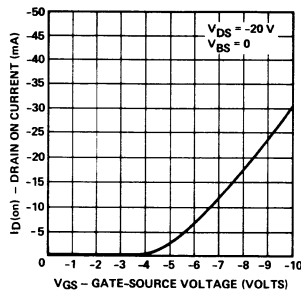
Low Voltage Output Characteristics



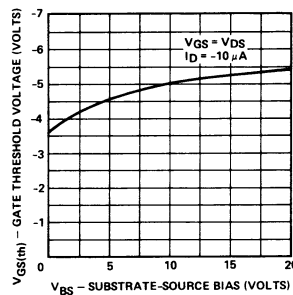
Gate Leakage Current vs Gate-Source Bias



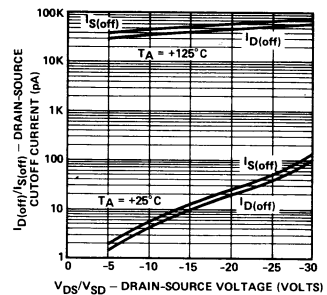
Transfer Characteristic



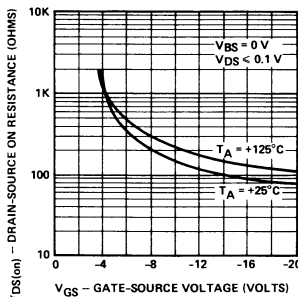
Gate Threshold Voltage vs Substrate Bias



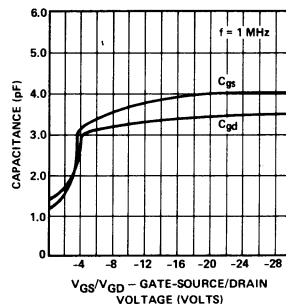
Source-Drain Leakage Currents vs Voltage



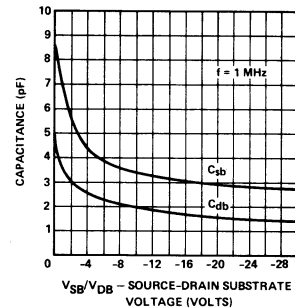
Drain-Source ON State Resistance vs Gate-Source Bias



Gate Capacitance vs Voltage



Substrate Capacitance vs Voltage



Performance Curves MT

See Page 4-18



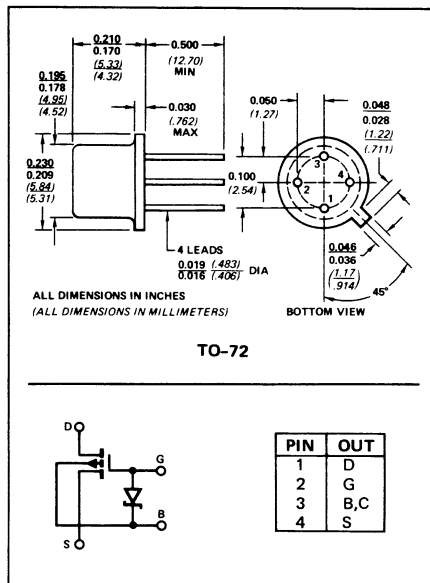
P-CHANNEL ENHANCEMENT-TYPE SILICON MOS FIELD-EFFECT TRANSISTOR

NORMALLY-OFF MOS FET FOR ANALOG AND DIGITAL SWITCHING APPLICATIONS

- Integrated Zener Clamp Protects the Gate
- C_{gs} Less Than 0.5 pF
- Very Low $I_{D(off)}$ and $I_{S(off)}$

ABSOLUTE MAXIMUM RATINGS (25°C)

| | | |
|--|-------|---------------|
| Drain-to-Source Voltage | | -30 V |
| Gate-to-Source Voltage | | -30 V |
| Gate-to-Drain Voltage | | -30 V |
| Drain Current | | -50 mA |
| Gate Current (Forward Direction for Zener Clamp) | | +0.1 mA |
| Operating Junction Temperature | | -55 to +125°C |
| Total Device Dissipation | | 225 mW |
| (Derate 2.25 mW/°C to 125°C) | | |
| Storage Temperature | | -65 to +150°C |

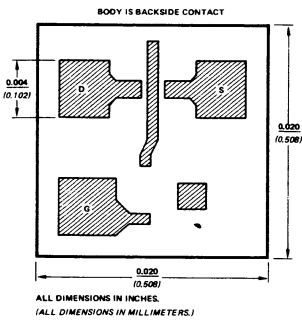


ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

| Characteristic | | Min | Typ | Max | Unit | Unit Conditions |
|----------------|--|-----|-----|-------|------|---|
| 1 | BV _{DSS} Drain-Source Breakdown Voltage | -30 | | | | $I_D = -1 \mu A, V_{GS} = V_{BS} = 0$ |
| 2 | BV _{SDS} Source-Drain Breakdown Voltage | -30 | | | V | $I_S = -1 \mu A, V_{GD} = V_{BD} = 0$ |
| 3 | BV _{GBS} Gate-Body Breakdown Voltage | -30 | | -90 | | $I_G = -10 \mu A, V_{SB} = V_{BD} = 0$ |
| 4 | I _{GSS} Gate-Body Leakage | | | -0.1 | nA | $V_{GS} = -20 V, V_{DS} = V_{BS} = 0$ |
| 5 | I _{D(off)} Drain Cutoff Current | | | -0.1 | nA | $V_{DS} = -20 V, V_{GS} = V_{BS} = 0$ |
| 6 | I _{S(off)} Source Cutoff Current | | | -0.1 | nA | $V_{SD} = -20 V, V_{GD} = V_{BD} = 0$ |
| 7 | V _{GS(th)} Gate Threshold Voltage | -3 | | -6 | V | $V_{GS} = V_{DS}, I_D = -10 \mu A, V_{BS} = 0$ |
| 8 | r _{DS(on)} Drain Source ON Resistance | | | 1,200 | Ω | $V_{GS} = -20 V, I_D = -100 \mu A, V_{BS} = 0$ |
| 9 | | | | 2,500 | | $V_{GS} = -10 V, I_D = -10 \mu A, V_{BS} = 0$ |
| 10 11 12 | C _{gs} or C _{gd} Gate-Source or Gate-Drain Capacitance | | | 0.5 | pF | $V_{GB} = V_{DB} = V_{SB} = 0$ Body Guarded |
| | C _{sb} or C _{db} Source-Body or Drain-Body Capacitance | | | 1.7 | | $V_{GB} = 0, V_{SB} = V_{DB} = -5V$ |
| | C _{ds} Drain-Source Capacitance | | 0.1 | | | $V_{GB} = 0, V_{DB} = V_{SB} = -5V$ Body Guarded |

MT

P-CHANNEL ENHANCEMENT-TYPE SILICON MOS FIELD-EFFECT TRANSISTOR



APPLICATIONS

- Analog and Switching Circuits

PRINCIPAL DEVICE

M104

FEATURES

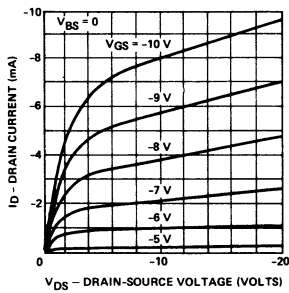
- Integrated Zener Clamp Protects the Gate
- C_{gs} Less Than 0.5 pF
- Very Low $I_{D(off)}$ and $I_{S(off)}$
- Normally OFF

PACKAGE TYPE

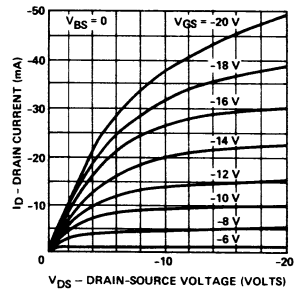
TO-72

PERFORMANCE CURVES (25°C unless otherwise noted)

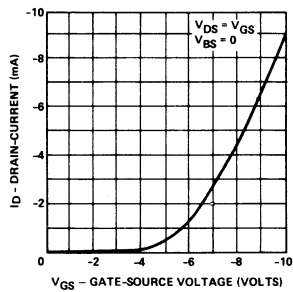
Output Characteristic



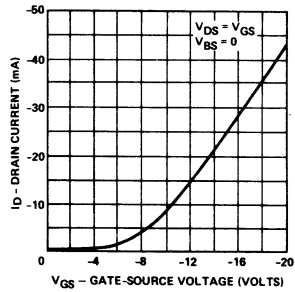
Output Characteristic



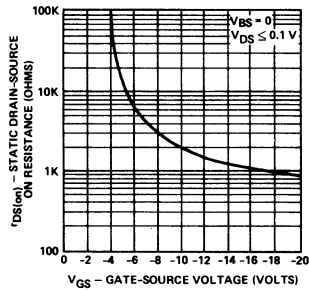
Transfer Characteristic



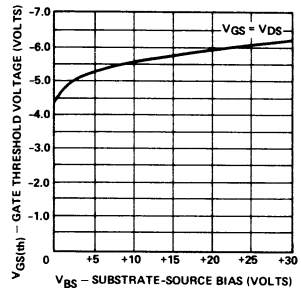
Transfer Characteristic



Drain-Source ON Resistance vs Gate-Source Bias

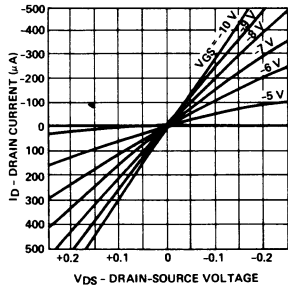


Gate Threshold Voltage vs Substrate Bias

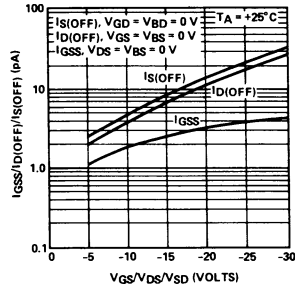


PERFORMANCE CURVES (Cont'd) (25°C unless otherwise noted)

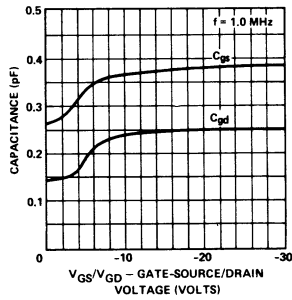
Low Voltage Output Characteristics



Leakage Currents vs Voltage



Gate Capacitance vs Voltage



Substrate Capacitance vs Voltage

