

# N-CHANNEL ENHANCEMENT—MODE D-MOS POWER FET

## FEATURES

- Lateral D-MOS Design
- Low ON Resistance — 1.1 ohms (typ)
- Extremely Low Drive Current
- Bi-Direction

## APPLICATIONS

- Broadband, High-Gain, RF Power Amplifiers
- Bi-Directional Logic Compatible Switches
- High Speed Line Drivers
- Bi-Directional Power Switches

## ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C unless otherwise noted)

|                    |                          |       |       |
|--------------------|--------------------------|-------|-------|
| V <sub>DS</sub>    | Drain-Source Voltage     | ..... | +25V  |
| V <sub>SD</sub>    | Source-Drain Voltage     | ..... | +15V  |
| V <sub>DB</sub>    | Drain-Body Voltage       | ..... | +20V  |
|                    |                          | ..... | -0.3V |
| V <sub>SB</sub>    | Source-Body Voltage      | ..... | +20V  |
|                    |                          | ..... | -0.3V |
| V <sub>GS</sub>    | Gate-Source Voltage      | ..... | ±30V  |
| V <sub>GD</sub>    | Gate-Drain Voltage       | ..... | ±30V  |
| V <sub>GB</sub>    | Gate-Body Voltage        | ..... | ±30V  |
| I <sub>D(on)</sub> | Continuous Drain Current |       |       |
|                    | (Note 1, Note 3)         | ..... | 2.0A  |
| I <sub>D(on)</sub> | Peak Drain Current       |       |       |
|                    | (Note 1, Note 3)         | ..... | 3.0A  |

|                  |                                       |       |               |
|------------------|---------------------------------------|-------|---------------|
| P <sub>D</sub>   | Continuous Power Dissipation (Note 1) |       |               |
|                  | T <sub>A</sub> = +25°C (Note 2)       | ..... | 1.0W          |
|                  | T <sub>C</sub> = +25°C (Note 3)       | ..... | 5.0W          |
|                  | Power Derating Factors (Note 1)       |       |               |
|                  | Free Air                              | ..... | 10mW/°C       |
|                  | Infinite Heat Sink                    | ..... | 50mW/°C       |
|                  | Thermal Resistance (Note 1)           |       |               |
| θ <sub>ja</sub>  | Junction to Ambient                   | ..... | 100°C/W       |
| θ <sub>jc</sub>  | Junction to Case                      | ..... | 20°C/W        |
| T <sub>op</sub>  | Operating Junction                    |       |               |
|                  | Temperature Range                     | ..... | -55 to +125°C |
| T <sub>stg</sub> | Storage Temperature Range             | ..... | -55 to +150°C |

Note 1: Not applicable to chips. Final value depends upon mounting.

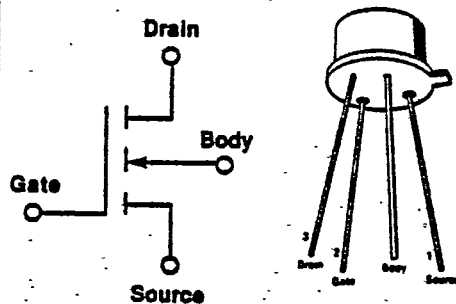
Note 2: Free Air

Note 3: Infinite Heat Sink

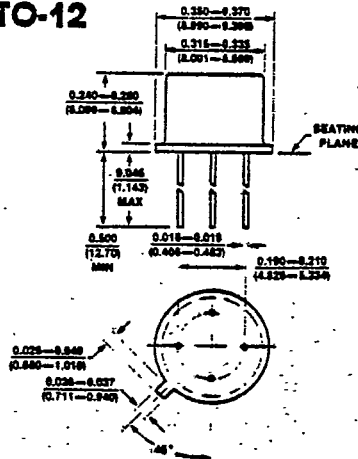
## ORDERING INFORMATION

|                          |        |
|--------------------------|--------|
| Sorted Chips in Carriers | XSD224 |
| TO-12 Package            | SD224H |

## SCHEMATIC DIAGRAM

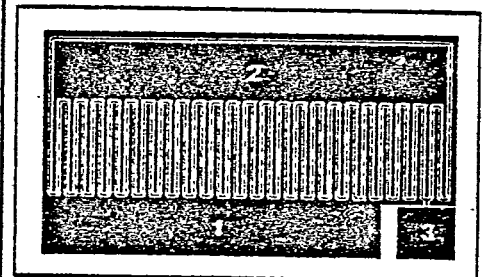


## PACKAGE DIMENSIONS TO-12



All dimensions in inches and (millimeters)

## CHIP CONFIGURATION



| PAD NO. | FUNCTION |
|---------|----------|
| 1       | SOURCE   |
| 2       | DRAIN    |
| 3       | GATE     |

Dimensions .091 x .055 x .010 inches

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

| #  | CHARACTERISTIC                                       | SD224 |     |           | UNITS         | TEST CONDITIONS  |
|----|--|-------|-----|-----------|---------------|--|
|    |  | MIN   | TYP | MAX       |               |  |
| 1  | $BV_{DSS}$ Drain-Source Breakdown Voltage            | 25    | 30  |           | V             | $I_D = 1.0\mu\text{A}, V_{GS} = V_{BS} = 0$  |
| 2  | $BV_{SDS}$ Source-Drain Breakdown Voltage            | 15    |     |           | V             | $I_S = 1.0\mu\text{A}, V_{GD} = V_{BD} = -5\text{V}$   |
| 3  | $BV_{DB}$ Drain-Body Breakdown Voltage               | 20    |     |           | V             | $I_D = 1.0\mu\text{A}, V_{GB} = 0$<br>Source Open  |
| 4  | $BV_{SB}$ Source-Body Breakdown Voltage              | 20    |     |           | V             | $I_S = 1.0\mu\text{A}, V_{GB} = 0$<br>Drain Open   |
| 5  | $I_{GSS}$ Gate-Body Leakage Current                  |       |     | $\pm 1.0$ | nA            | $V_{GB} = \pm 30\text{V}$<br>$V_{DB} = V_{SB} = 0$   |
| 6  | $I_{DSS}$ Drain-Source OFF Leakage Current           |       | 0.1 | 1.0       | $\mu\text{A}$ | $V_{DS} = 25\text{V}, V_{GS} = V_{BS} = 0$   |
| 7  | $V_{GS(th)}$ Gate-Source Threshold Voltage           | 0.1   | 1.0 | 2.3       | V             | $I_D = 10\mu\text{A}$<br>$V_{DS} = V_{GS}$<br>$V_{BS} = 0$                                   |
| 8  |  | 0.5   | 1.5 | 3.0       |               | $I_D = 1.0\text{mA}$   |
| 9  | $I_{D(on)}$ Drain-Source ON Current                  | 1.4   | 2.0 |           | A             | $V_{DS} = 2.2\text{V}$<br>$V_{GS} = 10\text{V}$  |
| 10 |  | 2.2   | 3.0 |           |               | $V_{DS} = 3.3\text{V}$<br>$V_{BS} = 0$<br>(Note 4)   |
| 11 | $r_{DS(on)}$ Drain-Source ON Resistance              |       | 1.4 | 2.0       | ohms          | $V_{GS} = 5\text{V}$<br>$V_{BS} = 0$<br>$I_D = 50\text{mA}$<br>(Note 4)                      |
| 12 |  |       | 1.1 | 1.5       |               | $V_{GS} = 10\text{V}$<br>$V_{BS} = 0$  |
| 13 |  |       | 1.1 | 1.5       |               | $I_D = 500\text{mA}$<br>(Note 4)   |
| 14 | $g_{fs}$ Common-Source Forward Transconductance      | 700   | 750 |           | mmhos         | $V_{DS} = 15\text{V}, I_D = 2.0\text{A}, V_{SB} = 0$<br>$f = 1\text{KHz}$<br>(Note 4)        |
| 15 | $C_{iss}$ Common-Source Input Capacitance            |       | 35  | 45        | pF            | $V_{DS} = 15\text{V}$<br>$V_{GS} = V_{BS} = 0$<br>$f = 1\text{MHz}$                          |
| 16 | $C_{rss}$ Common-Source Reverse Transfer Capacitance |       | 5.0 | 6.0       |               |  |
| 17 | $C_{oss}$ Common-Source Output Capacitance           |       | 20  | 25        |               |  |
| 18 | $t_{d(on)}$ Turn-On Delay Time                       |       | 1.0 | 2.0       | nSec          | $V_{DD} = 25\text{V}, R_L = 25\text{ ohms}$<br>$R_G = 51\text{ ohm}$<br>$V_{IN} = 5\text{V}$ |
| 19 | $t_r$ Rise Time                                      |       | 1.0 | 3.0       |               |  |
| 20 | $t_f$ Fall Time                                      |       | 3.0 | 5.0       |               |  |

Note 4: Pulse Test 80 $\mu\text{Sec}$ , 1% Duty Cycle