TOPAZ SEMICONDUCTOR

# SD5501

# N-CHANNEL DEPLETION-MODE 4-CHANNEL D-MOS FET ARRAY

## ORDERING INFORMATION

| | |
|---|---|
| Sorted Chips in Waffle Pack | SD5501CHP |
| 16-Pin Ceramic Dual In-Line Package | SD5501J |
| 16-Pin Plastic Dual In-Line Package | SD5501N |
| Description | 20V, 150Ω |

## FEATURES

- Normally ON Configuration
- Low Interelectrode Capacitances
- High-Speed Switching
- Wide Dynamic Range

## APPLICATIONS

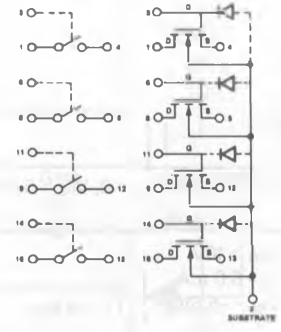
- High-Speed Analog Switches
- Wide-Band Dual Differential Amplifiers
- Dual Cascode Amplifiers
- High Intercept Point Double Balanced Mixers

## ABSOLUTE MAXIMUM RATINGS (per channel, $T_A$ = +25°C unless otherwise noted)

$V_{DS}$ Drain-Source Voltage ..... +30Vdc
$V_{SD}$ Source-Drain Voltage ..... +0.5Vdc
$V_{DB}$ Drain-Body Voltage ..... +30Vdc
$V_{SB}$ Source-Body Voltage ..... +15Vdc
$V_{GS}$ Gate-Source Voltage ..... +25Vdc
$V_{GB}$ Gate-Body Voltage ..... +25Vdc
Gate-Body Voltage ..... −0.3Vdc
$V_{GD}$ Gate-Drain Voltage ..... +25Vdc
$I_D$ Continuous Drain Current ..... 50mA

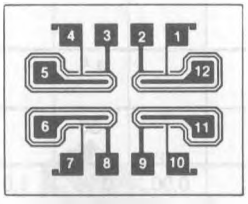
$P_D$ Total Package Power Dissipation (at or below $T_A$ = +25°C) ..... 640mW
Linear Derating Factor ..... 10.7mW/°C
$P_D$ Single Device Power Dissipation (at or below $T_A$ = +25°C) ..... 300mW
Linear Derating Factor ..... 5.0mW/°C
$T_j$ Operating Junction Temperature Range ..... −55 to +85°C
$T_S$ Storage Temperature Range .. −55 to +150°C

## SCHEMATIC DIAGRAM



Note: Pin numbers correspond to Package Pin-out

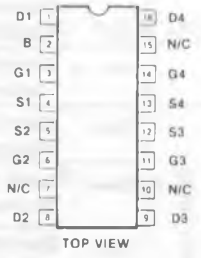
## CHIP CONFIGURATION




| PAD NO. | PAD FUNCTION | PAD NO. | PAD FUNCTION |
|---|---|---|---|
| 1 | Gate No. 1 | 7 | Gate No. 3 |
| 2 | Source No. 1 | 8 | Source No. 3 |
| 3 | Source No. 2 | 9 | Source No. 4 |
| 4 | Gate No. 2 | 10 | Gate No. 4 |
| 5 | Drain No. 2 | 11 | Drain No. 4 |
| 6 | Drain No. 3 | 12 | Drain No. 1 |

Dimensions: .041 × .033 × .020 inches

## PIN CONFIGURATION




TOP VIEW

**DIMENSIONS**

**16-Pin Plastic DIP**
See Package 10

**16-Pin Ceramic DIP**
See Package 15

**ELECTRICAL CHARACTERISTICS** (per channel, $T_A$ = +25°C, unless otherwise noted)

| # | | CHARACTERISTIC | | MIN | TYP | MAX | UNITS | TEST CONDITIONS | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | STATIC | $BV_{DS}$ | Drain-Source Breakdown Voltage | 20 | | | V | $I_D$ = 10nA, $V_{GS}$ = $V_{BS}$ = -5V | |
| 2 | | $BV_{SD}$ | Source-Drain Breakdown Voltage | 10 | | | | $I_S$ = 10nA, $V_{GD}$ = $V_{BD}$ = -5V | |
| 3 | | $BV_{DB}$ | Drain-Body Breakdown Voltage | 25 | | | | $I_D$ = 10nA, $V_{GB}$ = 0 Source Open | |
| 4 | | $BV_{SB}$ | Source-Body Breakdown Voltage | 15 | | | | $I_S$ = 10$\mu$A, $V_{GB}$ = 0 Drain open | |
| 5 | | $I_{GSS(fwd)}$ | Forward Gate Leakage Current | | | 1.0 | nA | $V_{GS}$ = 25V, $V_{DS}$ = $V_{BS}$ = 0 | |
| 6 | | $I_G$ | Gate Operating Current | | -3.0 | -100 | pA | $V_{DG}$ = 20V $I_D$ = 5.0 mA $V_{BS}$ = -5.6V | |
| 7 | | | | | -0.7 | -10 | nA | | $T_A$ = +125°C |
| 8 | | $V_{GS\ (off)}$ | Gate-Source Cutoff Voltage | -1.0 | | -5.0 | V | $V_{DS}$ = 10V, $I_D$ = 1.0$\mu$A $V_{BS}$ = -5.6V | |
| 9 | | $V_{GS(on)}$ | Gate-Source ON Voltage | -0.3 | | -3.0 | | $V_{DG}$ = 10V, $I_D$ = 5mA, $V_{SB}$ = -5.6V | |
| 10 | | $I_{DSX}$ | Zero Gate Voltage[1] Drain Current | 7.0 | | 40 | mA | $V_{DS}$ = 10V $V_{GS}$ = 0 $V_{BS}$ = -5.6V | |
| 11 | | | | 5.0 | | | | | $T_A$ = +125°C |
| 12 | | $r_{DS(ON)}$ | Drain-Source ON Resistance | | 100 | 150 | ohms | $I_D$ = 1.0mA, $V_{GS}$ = 0, $V_{BS}$ = -5.6V | |
| 13 | DYNAMIC | $g_{fs}$ | Common-Source[1] Forward Transconductance | 5.0 | 7.5 | 10 | mmhos | $V_{DG}$ = 10V $I_D$ = 5.0 mA $V_{BS}$ = -5.6V | f = 1 KHz |
| 14 | | $g_{os}$ | Common-Source Output Conductance | | 200 | 300 | $\mu$mhos | | |
| 15 | | $C_{iss}$ | Common-Source Input Capacitance | | 3.5 | | pF | | f = 1 MHz |
| 16 | | $C_{oss}$ | Common-Source Output Capacitance | | 1.2 | | | | |
| 17 | | $C_{rss}$ | Common-Source Reverse Transfer Capacitance | | 0.3 | | | | |
| 18 | | $C_{(gs\ +\ sb)}$ | Source Node Capacitance | | 4.5 | | | | |
| 19 | MATCHING | $V_{GSM}$ | Gate Source[2] Voltage Match | | 50 | | mV | | |
| 20 | | $r_{DS(on)}$ | Drain-Source[1, 2] ON Resistance Match | 0.90 | 0.98 | 1.0 | | $I_D$ = 1.0 mA, $V_{GS}$ = 0, $V_{BS}$ = 5.6V | |
| 21 | | $I_{DSXM}$ | Zero Gate Voltage[1, 2] Drain Current Match | 0.90 | | 1.0 | | $V_{DG}$ = 10V $I_D$ = 5.0 mA $V_{BS}$ = -5.6V | |
| 22 | | $g_{fsm}$ | Transconductance Match[1, 2] | 0.90 | | 1.0 | | | f = 1 KHz |

**Note 1:** Pulse Test, 80$\mu$sec, 1% Duty Cycle
**Note 2:** Match of 4 channels

**TYPICAL PERFORMANCE CHARACTERISTICS:** SEE TZ5911