

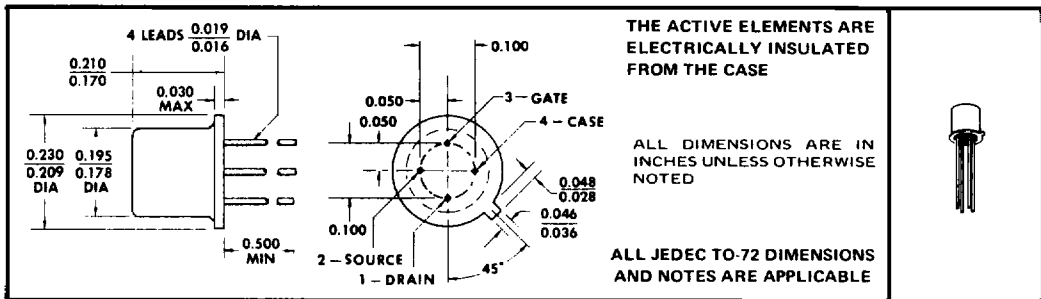
# TYPES 2N4220, 2N4221, 2N4222, 2N4220A, 2N4221A, 2N4222A N-CHANNEL SILICON JUNCTION FIELD-EFFECT TRANSISTORS

BULLETIN NO. DLS 7011340, JULY 1970

## N-CHANNEL FIELD-EFFECT TRANSISTORS

- Designed for General Purpose Amplifier and Switching Applications
- Low  $I_{GSS}$  . . . 100 pA Max
- Low Input Capacitance . . . 6 pF Max
- High  $|y_{fs}|/C_{iss}$  Ratio

### \*mechanical data



### \*absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)

|  |                |
|--|----------------|
| Drain-Gate Voltage . . . . .   | 30 V           |
| Drain-Source Voltage . . . . .   | 30 V           |
| Reverse Gate-Source Voltage . . . . .  | -30 V          |
| Continuous Forward Gate Current . . . . .  | 10 mA          |
| Continuous Drain Current . . . . .   | 15 mA          |
| Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 1) . . . . . | 300 mW         |
| Storage Temperature Range . . . . .  | -65°C to 200°C |
| Lead Temperature 1/16 Inch from Case for 10 Seconds . . . . .                                | 300°C          |

NOTE 1: Derate linearly to 175°C free-air temperature at the rate of 2 mW/°C.

\*JEDEC registered data. This data sheet contains all applicable registered data in effect at the time of publication.

USES CHIP JN51

# TYPES 2N4220, 2N4221, 2N4222, 2N4220A, 2N4221A, 2N4222A

## N-CHANNEL SILICON JUNCTION FIELD-EFFECT TRANSISTORS

electrical characteristics at 25°C free-air temperature (unless otherwise noted)

| PARAMETER  | TEST CONDITIONS†  | 2N4220<br>2N4220A |             | 2N4221<br>2N4221A |               | 2N4222<br>2N4222A |             | UNIT      |
|--|---|-------------------|-------------|-------------------|---------------|-------------------|-------------|-----------|
|  |   | MIN               | MAX         | MIN               | MAX           | MIN               | MAX         |           |
| $V_{(BR)GSS}$ Gate-Source Breakdown Voltage                        | $I_G = 10 \mu A, V_{DS} = 0$                            | -30*              |             | -30*              |               | -30*              |             | V         |
| $I_{GSS}$ Gate Reverse Current                                     | $V_{GS} = -15 V, V_{DS} = 0$                            |                   | -0.1*       |                   | -0.1*         |                   | -0.1*       | nA        |
|  | $V_{GS} = -15 V, V_{DS} = 0, T_A = 150^\circ C$         |                   | -0.1*       |                   | -0.1*         |                   | -0.1*       | $\mu A$   |
| $V_{GS(off)}$ Gate-Source Cutoff Voltage                           | $V_{DS} = 15 V, I_D = 0.1 nA$                           |                   | -4*         |                   | -6*           |                   | -8*         | V         |
| $V_{GS}$ Gate-Source Voltage                                       | $V_{DS} = 15 V, I_D = 50 \mu A$                         |                   | -0.5* -2.5* |                   |               |                   |             | V         |
|  | $V_{DS} = 15 V, I_D = 200 \mu A$                        |                   |             |                   | -1* -5*       |                   |             |           |
|  | $V_{DS} = 15 V, I_D = 500 \mu A$                        |                   |             |                   |               |                   | -2* -6*     |           |
| $I_{DSS}$ Zero-Gate-Voltage Drain Current                          | $V_{DS} = 15 V, V_{GS} = 0,$<br>See Note 2              | 0.5*              | 3*          | 2*                | 6*            | 5*                | 15*         | mA        |
| $ y_{fs} $ Small-Signal Common-Source Forward Transfer Admittance  | $V_{DS} = 15 V, V_{GS} = 0,$<br>$f = 1 kHz,$ See Note 2 |                   | 1* 4*       |                   | 2* 5*         |                   | 2.5* 6*     | mmho      |
| $ y_{os} $ Small-Signal Common-Source Output Admittance            |   |                   | 10*         |                   | 20*           |                   | 40*         | $\mu mho$ |
| $C_{iss}$ Common-Source Short-Circuit Input Capacitance            | $V_{DS} = 15 V, V_{GS} = 0,$<br>$f = 1 MHz$             |                   | 6*          |                   | 6*            |                   | 6*          | pF        |
| $C_{rss}$ Common-Source Short-Circuit Reverse Transfer Capacitance |   |                   | 2*          |                   | 2*            |                   | 2*          | pF        |
| $ y_{fs} $ Small-Signal Common-Source Forward Transfer Admittance  | $V_{DS} = 15 V, V_{GS} = 0,$<br>$f = 100 MHz$           |                   | 0.75*       |                   | 1.5*<br>0.75* |                   | 2*<br>0.75* | mmho      |

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operating characteristics at 25°C free-air temperature

| PARAMETER                          | TEST CONDITIONS†   | 2N4220A<br>2N4221A<br>2N4222A |      | UNIT |
|------------------------------------|--|-------------------------------|------|------|
|                                    |  | MIN                           | MAX  |      |
| NF Common-Source Spot Noise Figure | $V_{DS} = 15 V, V_{GS} = 0, f = 100 Hz, R_G = 1 M\Omega$ |                               | 2.5* | dB   |

NOTE 2: These parameters must be measured using pulse techniques,  $t_w = 100 ms,$  duty cycle  $\leq 10\%$ .

†The fourth lead (case) is connected to the source for all measurements.

\*JEDEC registered data

§Texas Instruments guarantees these values in addition to the JEDEC registered values which are also shown.