



Monolithic N-Channel JFET Duals

| PRODUCT SUMMARY | | | | | |
|-----------------|--------------------------|------------------------------|--------------------------|-------------------------|--|
| Part Number | V _{GS(off)} (V) | V _{(BR)GSS} Min (V) | g _{fs} Min (mS) | I _G Max (pA) | V _{GS1} - V _{GS2} Max (mV) |
| 2N5196 | -0.7 to -4 | -50 | 1 | -15 | 5 |
| 2N5197 | -0.7 to -4 | -50 | 1 | -15 | 5 |
| 2N5198 | -0.7 to -4 | -50 | 1 | -15 | 10 |
| 2N5199 | -0.7 to -4 | -50 | 1 | -15 | 15 |

FEATURES

- Monolithic Design
- High Slew Rate
- Low Offset/Drift Voltage
- Low Gate Leakage: 5 pA
- Low Noise
- High CMRR: 100 dB

BENEFITS

- Tight Differential Match vs. Current
- Improved Op Amp Speed, Settling Time Accuracy
- Minimum Input Error/Trimming Requirement
- Insignificant Signal Loss/Error Voltage
- High System Sensitivity
- Minimum Error with Large Input Signal

APPLICATIONS

- Wideband Differential Amps
- High-Speed, Temp-Compensated, Single-Ended Input Amps
- High Speed Comparators
- Impedance Converters

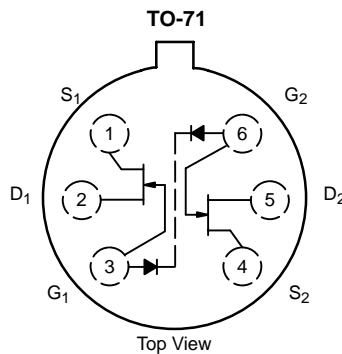
Datasheet Directory

DESCRIPTION

The 2N5196/5197/5198/5199 JFET duals are designed for high-performance differential amplification for a wide range of precision test instrumentation applications. This series features tightly matched specs, low gate leakage for accuracy, and wide dynamic range with I_G guaranteed at V_{DG} = 20 V.

The hermetically-sealed TO-71 package is available with full military processing (see Military Information and the 2N5545/5546/5547JANTX/JANTXV data sheet).

For similar products see the low-noise U/SST401 series, the high-gain 2N5911/5912, and the low-leakage U421/423 data sheets.



ABSOLUTE MAXIMUM RATINGS

Gate-Drain, Gate-Source Voltage -50 V
 Gate Current 50 mA
 Lead Temperature (1/16" from case for 10 sec.) 300 °C
 Storage Temperature -65 to 200 °C
 Operating Junction Temperature -55 to 150 °C

Power Dissipation : Per Side^a 250 mW
 Total^b 500 mW

Notes
 a. Derate 2 mW/°C above 85 °C
 b. Derate 4 mW/°C above 85 °C



| SPECIFICATIONS FOR 2N5196 AND 2N5197 (T _A = 25 °C UNLESS OTHERWISE NOTED) | | | | | | | | |
|--|--|---|------------------|--------|------|--------|------|------------|
| Parameter | Symbol | Test Conditions | Typ ^a | Limits | | | | Unit |
| | | | | 2N5196 | | 2N5197 | | |
| | | | | Min | Max | Min | Max | |
| Static | | | | | | | | |
| Gate-Source Breakdown Voltage | V _{(BR)GSS} | I _G = -1 μA, V _{DS} = 0 V | -57 | -50 | | -50 | | V |
| Gate-Source Cutoff Voltage | V _{GS(off)} | V _{DS} = 20 V, I _D = 1 nA | -2 | -0.7 | -4 | -0.7 | -4 | |
| Saturation Drain Current ^b | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | 3 | 0.7 | 7 | 0.7 | 7 | mA |
| Gate Reverse Current | I _{GSS} | V _{GS} = -30 V, V _{DS} = 0 V | -10 | | -25 | | -25 | pA |
| | | T _A = 150 °C | -20 | | -50 | | -50 | nA |
| Gate Operating Current | I _G | V _{DG} = 20 V, I _D = 200 μA | -5 | | -15 | | -15 | pA |
| | | T _A = 125 °C | -0.8 | | -15 | | -15 | nA |
| Gate-Source Voltage | V _{GS} | V _{DG} = 20 V, I _D = 200 μA | -1.5 | -0.2 | -3.8 | -0.2 | -3.8 | V |
| Dynamic | | | | | | | | |
| Common-Source Forward Transconductance | g _{fs} | V _{DS} = 20 V, V _{GS} = 0 V f = 1 kHz | 2.5 | 1 | 4 | 1 | 4 | mS |
| Common-Source Output Conductance | g _{os} | | 2 | | 50 | | 50 | μS |
| Common-Source Forward Transconductance | g _{fs} | V _{DS} = 20 V, I _D = 200 μA f = 1 kHz | 0.8 | 0.7 | 1.6 | 0.7 | 1.6 | mS |
| Common-Source Output Conductance | g _{os} | | 1 | | 4 | | 4 | μS |
| Common-Source Input Capacitance | C _{iss} | V _{DS} = 20 V, V _{GS} = 0 V f = 1 MHz | 3 | | 6 | | 6 | pF |
| Common-Source Reverse Transfer Capacitance | C _{rss} | | 1 | | 2 | | 2 | |
| Equivalent Input Noise Voltage | e _n | V _{DS} = 20 V, V _{GS} = 0 V, f = 1 kHz | 9 | | 20 | | 20 | nV/ √Hz |
| Noise Figure | NF | V _{DS} = 20 V, V _{GS} = 0 V f = 100 Hz, R _G = 10 MΩ | | | 0.5 | | 0.5 | dB |
| Matching | | | | | | | | |
| Differential Gate-Source Voltage | V _{GS1} - V _{GS2} | V _{DG} = 20 V, I _D = 200 μA | | | 5 | | 5 | mV |
| Gate-Source Voltage Differential Change with Temperature | $\frac{\Delta V_{GS1} - V_{GS2} }{\Delta T}$ | V _{DG} = 20 V, I _D = 200 μA T _A = -55 to 125 °C | | | 5 | | 10 | μV/°C |
| Saturation Drain Current Ratio | $\frac{I_{DSS1}}{I_{DSS2}}$ | V _{DS} = 20 V, V _{GS} = 0 V | 0.98 | 0.95 | 1 | 0.95 | 1 | |
| Transconductance Ratio | $\frac{g_{fs1}}{g_{fs2}}$ | V _{DS} = 20 V, I _D = 200 μA f = 1 kHz | 0.99 | 0.97 | 1 | 0.97 | 1 | |
| Differential Output Conductance | g _{os1} - g _{os2} | | 0.1 | | 1 | | 1 | μS |
| Differential Gate Current | _{G1} - I _{G2} | V _{DG} = 20 V, I _D = 200 μA, T _A = 125 °C | 0.1 | | 5 | | 5 | nA |
| Common Mode Rejection Ratio ^c | CMRR | V _{DG} = 10 to 20 V, I _D = 200 μA | 100 | | | | | dB |



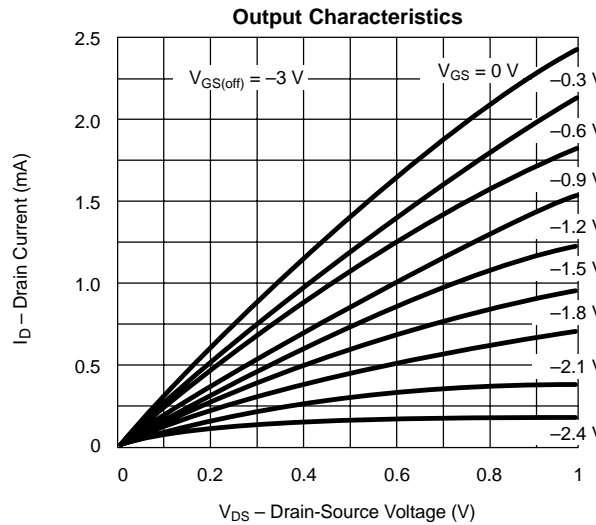
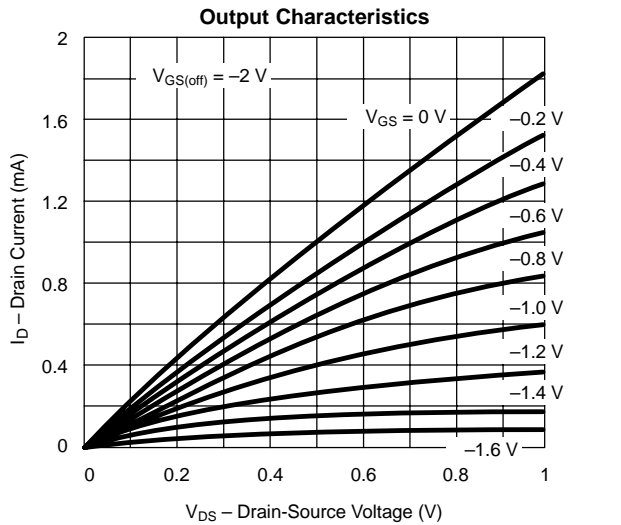
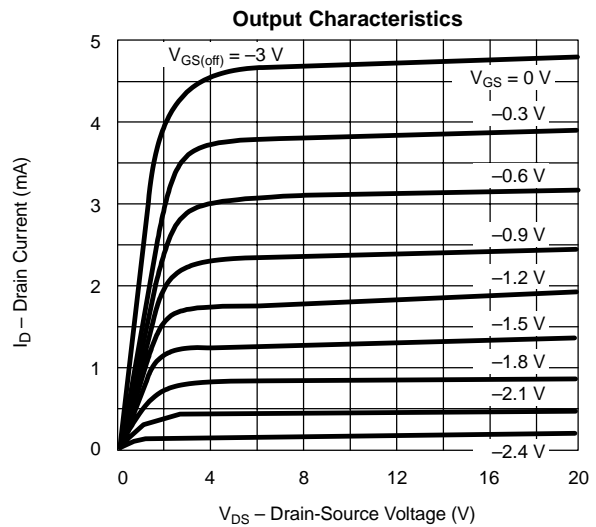
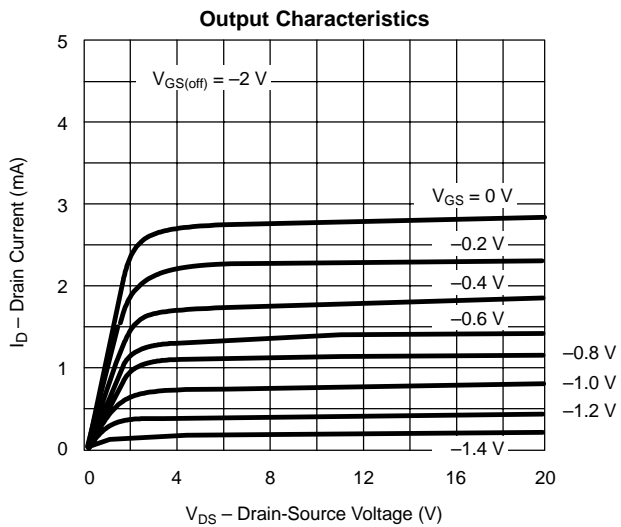
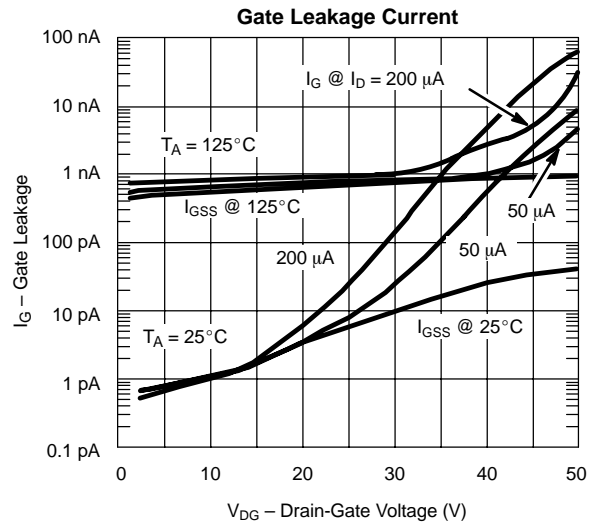
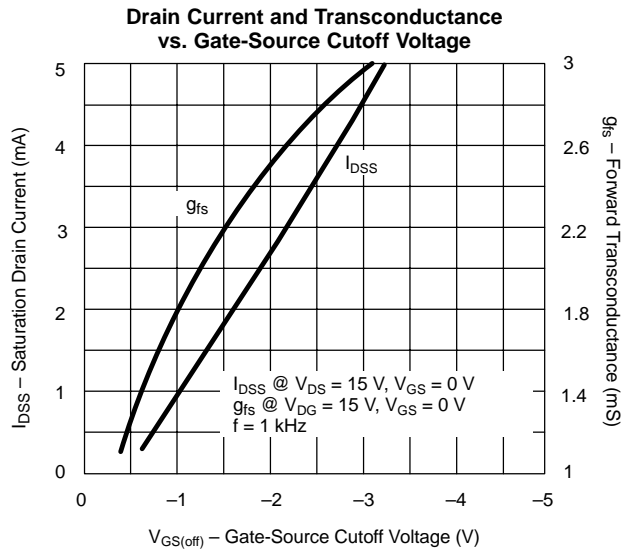
| SPECIFICATIONS FOR 2N5198 AND 2N5199 (T _A = 25 °C UNLESS OTHERWISE NOTED) | | | | | | | | | |
|--|--|---|-------------------------|--------|------|--------|------|------------|----|
| Parameter | Symbol | Test Conditions | Typ ^a | Limits | | | | Unit | |
| | | | | 2N5198 | | 2N5199 | | | |
| | | | | Min | Max | Min | Max | | |
| Static | | | | | | | | | |
| Gate-Source Breakdown Voltage | V _{(BR)GSS} | I _G = -1 μA, V _{DS} = 0 V | -57 | -50 | | -50 | | V | |
| Gate-Source Cutoff Voltage | V _{GS(off)} | V _{DS} = 20 V, I _D = 1 nA | -2 | -0.7 | -4 | -0.7 | -4 | | |
| Saturation Drain Current ^b | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | 3 | 0.7 | 7 | 0.7 | 7 | mA | |
| Gate Reverse Current | I _{GSS} | V _{GS} = -30 V, V _{DS} = 0 V | | | | | | μA | |
| | | | T _A = 150 °C | -10 | | -25 | | -25 | pA |
| Gate Operating Current | I _G | V _{DG} = 20 V, I _D = 200 μA | | | | | | pA | |
| | | | T _A = 125 °C | -5 | | -15 | | -15 | nA |
| Gate-Source Voltage | V _{GS} | V _{DG} = 20 V, I _D = 200 μA | -1.5 | -0.2 | -3.8 | -0.2 | -3.8 | V | |
| Dynamic | | | | | | | | | |
| Common-Source Forward Transconductance | g _{fs} | V _{DS} = 20 V, V _{GS} = 0 V, f = 1 kHz | 2.5 | 1 | 4 | 1 | 4 | mS | |
| Common-Source Output Conductance | g _{os} | | 2 | | 50 | | 50 | μS | |
| Common-Source Forward Transconductance | g _{fs} | V _{DS} = 20 V, I _D = 200 μA f = 1 kHz | 0.8 | 0.7 | 1.6 | 0.7 | 1.6 | mS | |
| Common-Source Output Conductance | g _{os} | | 1 | | 4 | | 4 | μS | |
| Common-Source Input Capacitance | C _{iss} | V _{DS} = 20 V, V _{GS} = 0 V, f = 1 MHz | 3 | | 6 | | 6 | pF | |
| Common-Source Reverse Transfer Capacitance | C _{rss} | | 1 | | 2 | | 2 | | |
| Equivalent Input Noise Voltage | e _n | V _{DS} = 20 V, V _{GS} = 0 V, f = 1 kHz | 9 | | 20 | | 20 | nV/ √Hz | |
| Noise Figure | NF | V _{DS} = 20 V, V _{GS} = 0 V f = 100 Hz, R _G = 10 MΩ | | | 0.5 | | 0.5 | dB | |
| Matching | | | | | | | | | |
| Differential Gate-Source Voltage | V _{GS1} - V _{GS2} | V _{DG} = 20 V, I _D = 200 μA | | | 10 | | 15 | mV | |
| Gate-Source Voltage Differential Change with Temperature | $\frac{\Delta V_{GS1} - V_{GS2} }{\Delta T}$ | V _{DG} = 20 V, I _D = 200 μA T _A = -55 to 125 °C | | | 20 | | 40 | μV/°C | |
| Saturation Drain Current Ratio | $\frac{I_{DSS1}}{I_{DSS2}}$ | V _{DS} = 20 V, V _{GS} = 0 V | 0.97 | 0.95 | 1 | 0.95 | 1 | | |
| Transconductance Ratio | $\frac{g_{fs1}}{g_{fs2}}$ | V _{DS} = 20 V, I _D = 200 μA f = 1 kHz | 0.97 | 0.95 | 1 | 0.95 | 1 | | |
| Differential Output Conductance | g _{os1} - g _{os2} | | 0.2 | | 1 | | 1 | μS | |
| Differential Gate Current | I _{G1} - I _{G2} | V _{DG} = 20 V, I _D = 200 μA, T _A = 125 °C | 0.1 | | 5 | | 5 | nA | |
| Common Mode Rejection Ratio ^c | CMRR | V _{DG} = 10 to 20 V, I _D = 200 μA | 97 | | | | | dB | |

Notes

- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 3%.
- c. This parameter not registered with JEDEC.

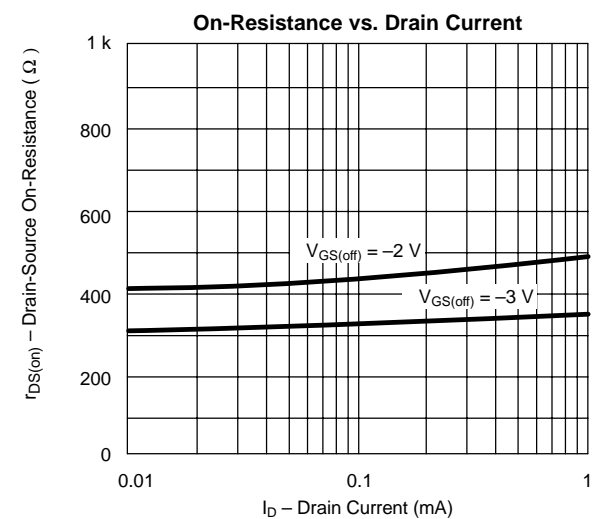
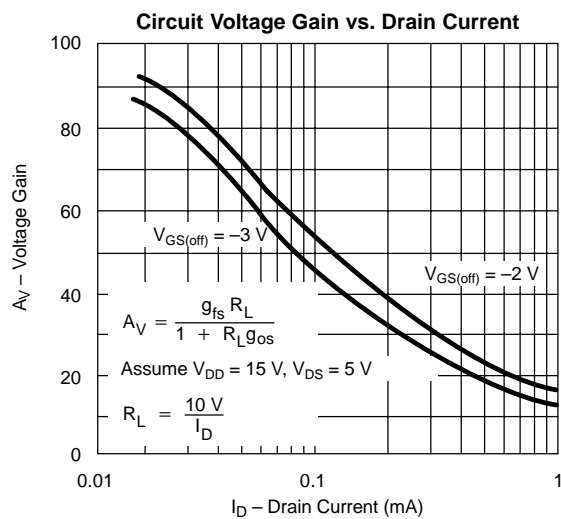
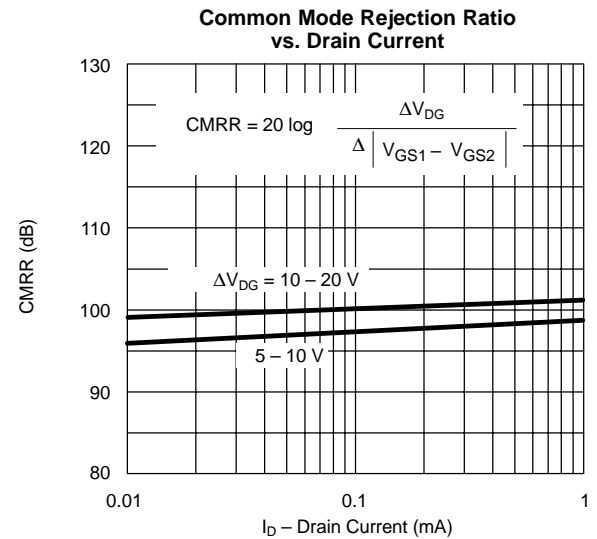
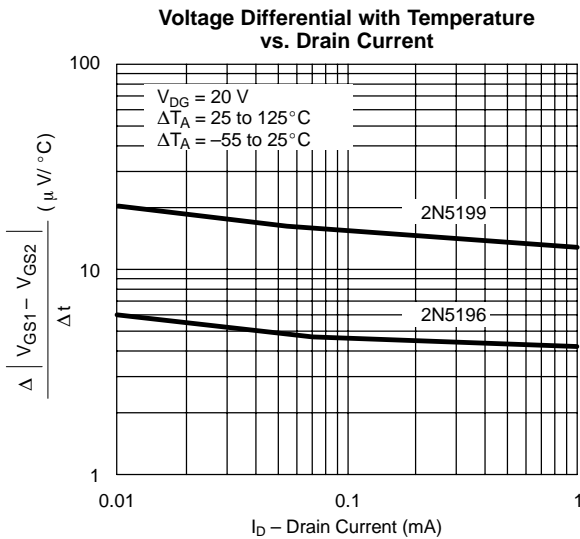
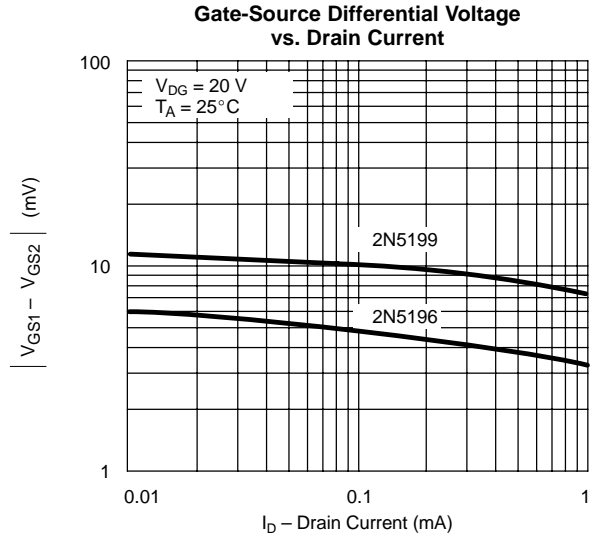
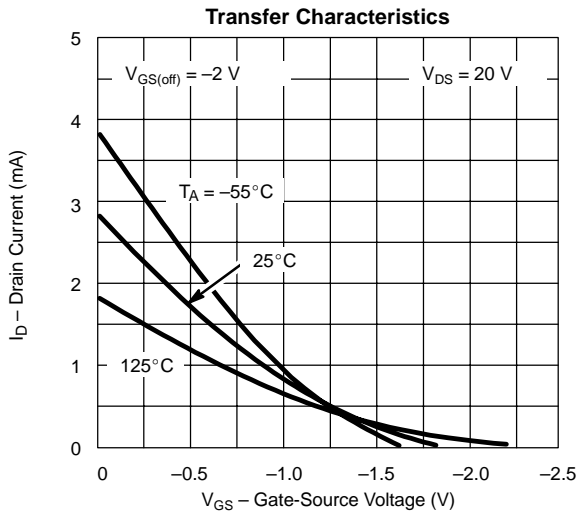
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TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)





TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)



TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

