



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

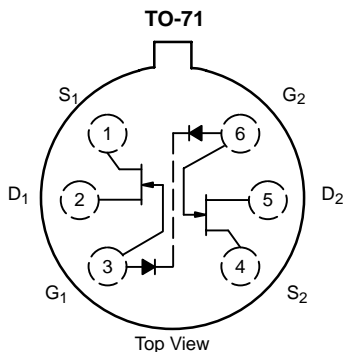
- Wideband Differential Amps
- High-Speed, Temp-Compensated, Single-Ended Input Amps
- High Speed Comparators
- Impedance Converters

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

- Derate 2 mW/°C above 85 °C
- 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	\bar{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	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	100					dB

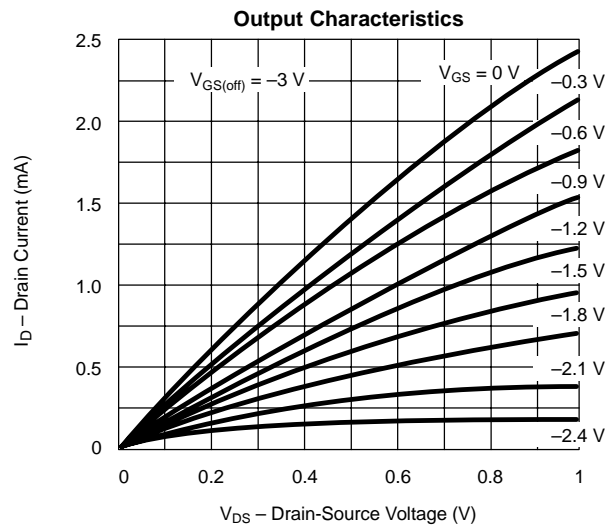
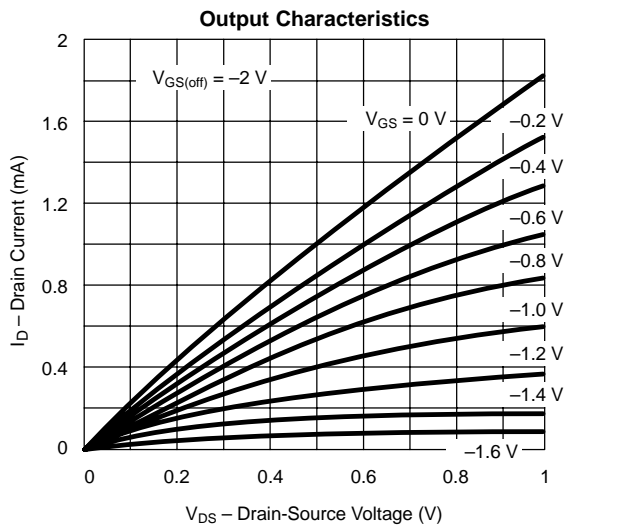
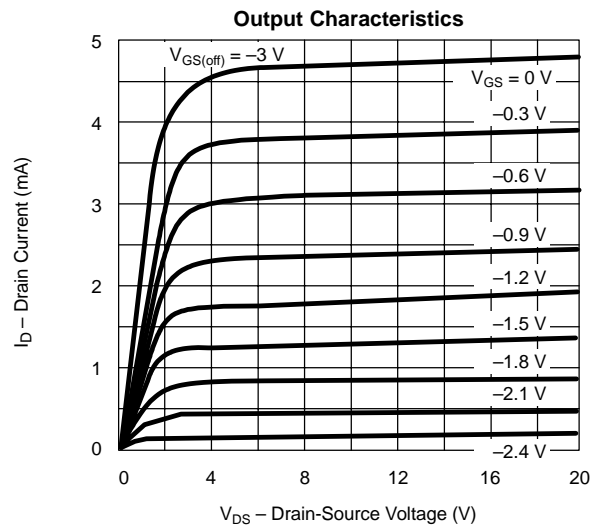
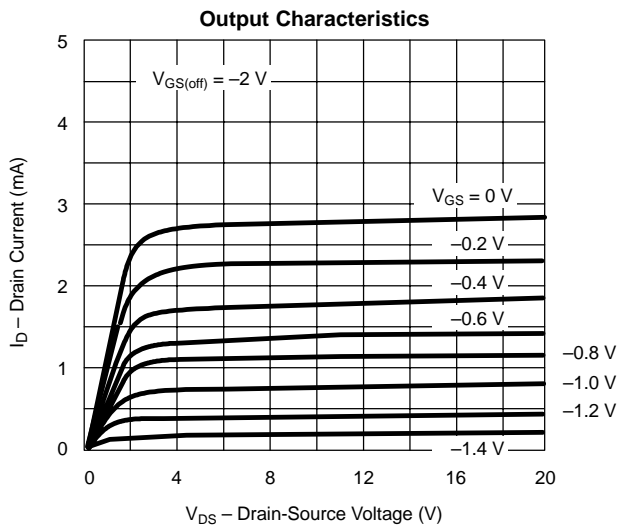
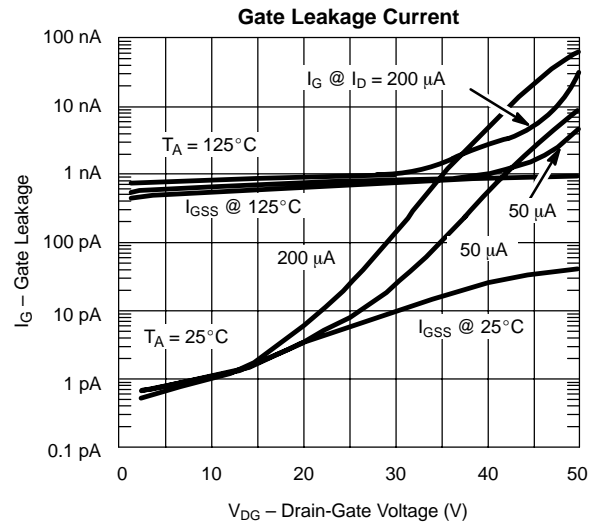
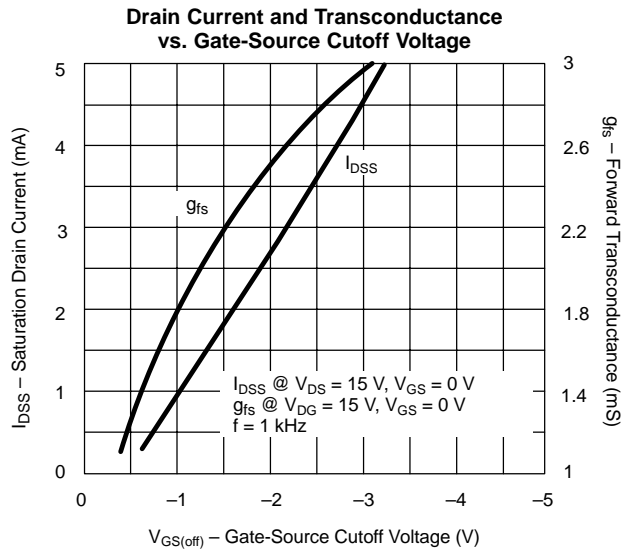
**SPECIFICATIONS FOR 2N5198 AND 2N5199 ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)**

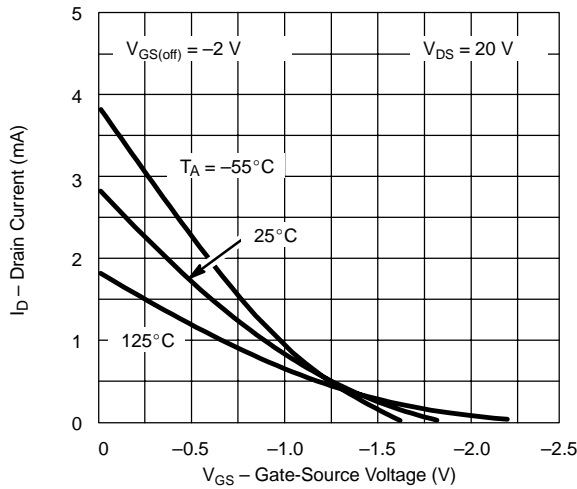
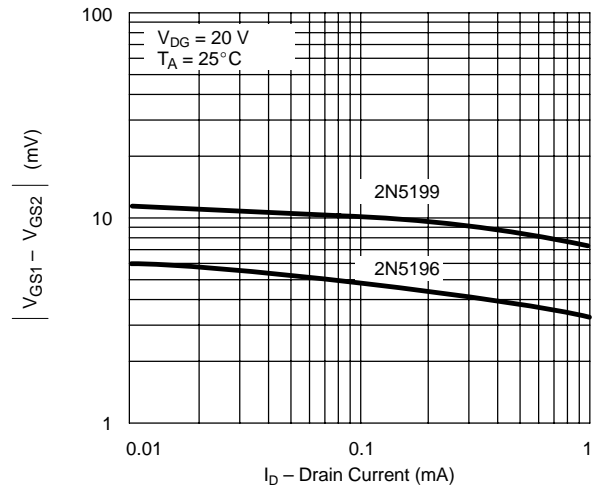
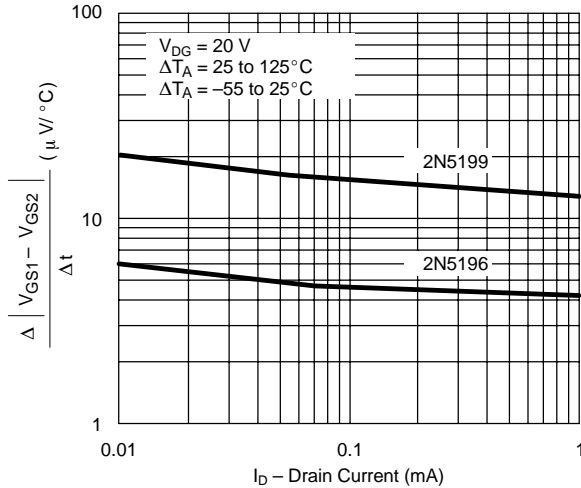
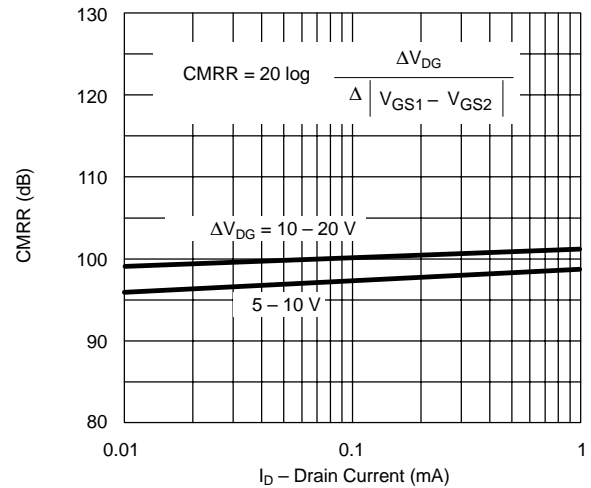
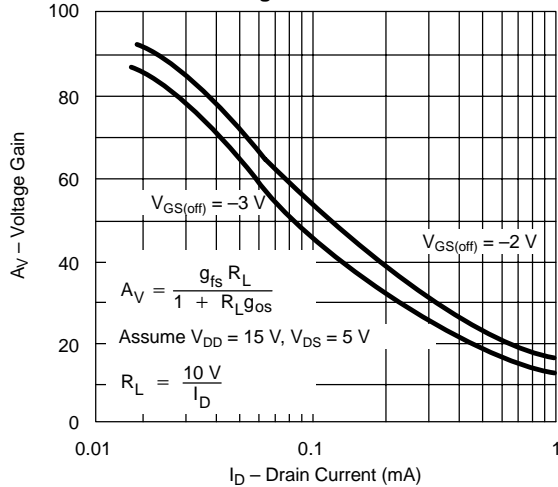
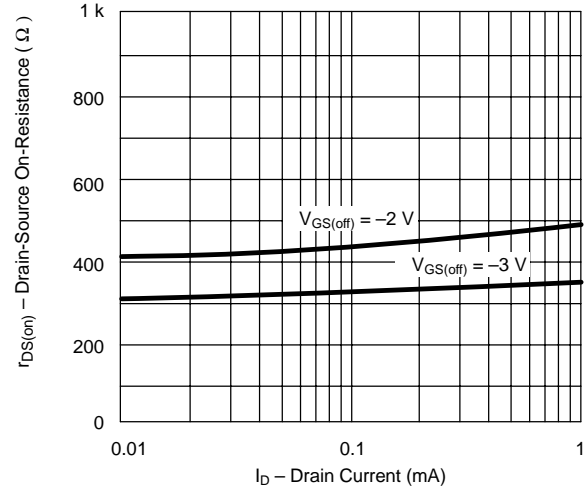
Parameter	Symbol	Test Conditions	Typ ^a	Limits				Unit
				2N5198		2N5199		
				Min	Max	Min	Max	
Static								
Gate-Source Breakdown Voltage	V _{(BR)GSS}	I _G = −1 μA, V _{DS} = 0 V	−57	−50		−50		V
Gate-Source Cutoff Voltage	V _{GS(off)}	V _{DS} = 20 V, I _D = 1 nA	−2	−0.7	−4	−0.7	−4	
Saturation Drain 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	−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			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: $PW \leq 300\ \mu\text{s}$ duty cycle $\leq 3\%$.
c. This parameter not registered with JEDEC.

NQP

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

**TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)****Transfer Characteristics****Gate-Source Differential Voltage vs. Drain Current****Voltage Differential with Temperature vs. Drain Current****Common Mode Rejection Ratio vs. Drain Current****Circuit Voltage Gain vs. Drain Current****On-Resistance vs. Drain Current**

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