

2N3821, 2N3822

N-Channel Silicon Junction Field-Effect Transistor

- VHF Amplifiers
- Small Signal Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 50 V

Continuous Forward Gate Current

10 mA

Continuous Device Power Dissipation

300 mW

Power Derating

2mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N3821		2N3822		Process NJ32	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 0.1		– 0.1	μA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$ $T_A = 150^\circ\text{C}$
Gate Source Voltage	V_{GS}	– 0.5	– 2			V	$V_{DS} = 15\text{V}$, $I_D = 50\ \mu\text{A}$
				– 1	– 4	V	$V_{DS} = 15\text{V}$, $I_D = 200\ \mu\text{A}$
						V	$V_{DS} = 15\text{V}$, $I_D = 400\ \mu\text{A}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 4		– 6	V	$V_{DS} = 15\text{V}$, $I_D = 0.5\ \text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	2.5	2	10	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$					nA	$V_{DS} = 15\text{V}$, $V_{GS} = -8\text{V}$
						μA	$V_{DS} = 15\text{V}$, $V_{GS} = -8\text{V}$ $T_A = 150^\circ\text{C}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$					Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Forward Transconductance	g_{fs}	1500	4500	3000	6500	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Forward Transmittance	$ Y_{fs} $	1500		3000		μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 100\ \text{MHz}$
Common Source Output Conductance	g_{os}		10		20	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		6		6	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		2		2	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		200		200	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 10\ \text{Hz}$
Noise Figure	NF		5		5	dB	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$ $R_G = 1\ \text{M}\Omega$	$f = 10\ \text{Hz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case



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2N3823, 2N3824

N-Channel Silicon Junction Field-Effect Transistor

- VHF Amplifiers
- Small Signal Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage
 Continuous Forward Gate Current
 Continuous Device Power Dissipation
 Power Derating

– 50 V
 10 mA
 300 mW
 2 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N3823		2N3824		Process NJ32	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 50		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}		– 0.5		– 0.1	nA	$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$
			– 0.5		– 0.1	μA	$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$ $T_A = 150^\circ\text{C}$
Gate Source Voltage	V_{GS}	– 1	– 7.5			V	$V_{DS} = 15\text{V}$, $I_D = 400\ \mu\text{A}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 8			V	$V_{DS} = 15\text{V}$, $I_D = 0.5\ \text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	4	20			mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$				0.1	nA	$V_{DS} = 15\text{V}$, $V_{GS} = -8\text{V}$
					0.1	μA	$V_{DS} = 15\text{V}$, $V_{GS} = -8\text{V}$ $T_A = 150^\circ\text{C}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$				250	Ω	$V_{GS} = 0\text{V}$, $I_D = 0\text{V}$	$f = 1\ \text{kHz}$
Common Source Forward Transconductance	g_{fs}	3500	6500			μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\ \text{kHz}$
Common Source Forward Transmittance	$ Y_{fs} $	3200				μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\ \text{MHz}$
Common Source Output Conductance	g_{os}		35			μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		6		6	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		2		3	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\ \text{MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		200			nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 10\ \text{Hz}$
Noise Figure	NF		6			dB	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$ $R_G = 1\ \text{M}\Omega$	$f = 10\ \text{Hz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

2N3954, 2N3955, 2N3956

N-Channel Dual Silicon Junction Field-Effect Transistor

- Low and Medium Frequency Differential Amplifiers
- High Input Impedance Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 50 V

Gate Current

50 mA

Total Device Power Dissipation (each side)

250 mW

@ 85°C Case Temperature (both sides)

500 mW

Power Derating (both sides)

4.3 mW/ $^\circ\text{C}$ At 25°C free air temperature:
Static Electrical Characteristics

		2N3954		2N3955		2N3956		Process NJ16		
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		– 50		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 100		– 100		– 100	pA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$	
			– 500		– 500		– 500	nA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 125^\circ\text{C}$
Gate Operating Current	I_G		– 50		– 50		– 50	pA	$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	
			– 250		– 250		– 250	nA	$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	$T_A = 125^\circ\text{C}$
Gate Source Voltage	V_{GS}		– 4.2		– 4.2		– 4.2	V	$V_{DS} = 20\text{V}$, $I_D = 50\mu\text{A}$	
		– 0.5	– 4	– 0.5	– 4	– 0.5	– 4	V	$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 4.5	– 1	– 4.5	– 1	– 4.5	V	$V_{DS} = -20\text{V}$, $I_G = 1\text{nA}$	
Gate Source Forward Voltage	$V_{GS(F)}$		2		2		2	V	$V_{DS} = \emptyset\text{V}$, $I_G = 1\text{mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	5	0.5	5	0.5	5	mA	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	1000	3000	1000	3000	1000	3000	μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{kHz}$
		1000		1000		1000		μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 200\text{MHz}$
Common Source Output Capacitance	g_{os}		35		35		35	μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{kHz}$
Common Source Input Capacitance	C_{iss}		4		4		4	pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{MHz}$
Drain Gate Capacitance	C_{dgo}		1.5		1.5		1.5	pF	$V_{dg} = 10\text{V}$, $I_S = \emptyset\text{A}$	$f = 1\text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2		1.2	pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{MHz}$
Noise Figure	NF		0.5		0.5		0.5	dB	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$, $R_g = 10\text{M}\Omega$	$f = 100\text{Hz}$
Differential Gate Current	$ I_{G1} - I_{G2} $		10		10		10	nA	$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	$T_A = 125^\circ\text{C}$
Saturation Drain Current Ratio	I_{DSS1}/I_{DSS2}	0.95	1	0.95	1	0.95	1		$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	
Differential Gate Source Voltage	$ V_{GS1} - V_{GS2} $		5		10		15	mV	$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	
Differential Gate Source Voltage with Temperature	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		0.8		2		4	mV/ $^\circ\text{C}$	$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	$T_A = 25^\circ\text{C}$ to -55°C
			1		2.5		5	mV/ $^\circ\text{C}$	$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	$T_A = 25^\circ\text{C}$ to $+125^\circ\text{C}$
Transconductance Ratio	g_{fs1}/g_{fs2}	0.97	1	0.97	1	0.97	1		$V_{DS} = 20\text{V}$, $I_D = 200\mu\text{A}$	$f = 1\text{kHz}$

TO-71 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate,
5 Source, 6 Drain, 7 Gate

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2N3957, 2N3958

N-Channel Dual Silicon Junction Field-Effect Transistor

- Low and Medium Frequency Differential Amplifiers
- High Input Impedance Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 50 V

Gate Current

50 mA

Total Device Power Dissipation (each side)

250 mW

@ 85°C Case Temperature (both sides)

500 mW

Power Derating (both sides)

4.3 mW/ $^\circ\text{C}$ At 25°C free air temperature:

Static Electrical Characteristics

		2N3957		2N3958		Process NJ16	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 500		– 500	nA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$ $T_A = 125^\circ\text{C}$
Gate Operating Current	I_G		– 50		– 50	pA	$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$
			– 250		– 250	nA	$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$ $T_A = 125^\circ\text{C}$
Gate Source Voltage	V_{GS}		– 4.2		– 4.2	V	$V_{DS} = 20\text{V}$, $I_D = 50\ \mu\text{A}$
		– 0.5	– 4	– 0.5	– 4	V	$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 4.5	– 1	– 4.5	V	$V_{DS} = 20\text{V}$, $I_D = 1\ \text{nA}$
Gate Source Forward Voltage	$V_{GS(F)}$		2		2	V	$V_{DS} = \emptyset$, $I_G = 1\ \text{mA}$
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	5	0.5	5	mA	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	1000	3000	1000	3000	μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
		1000		1000		μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 200\ \text{MHz}$
Common Source Output Conductance	g_{os}		35		35	μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		4		4	pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Drain Gate Capacitance	C_{dgo}		1.5		1.5	pF	$V_{DS} = 10\text{V}$, $I_S = \emptyset\text{A}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Noise Figure	NF		0.5		0.5	dB	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$ $R_G = 10\ \text{M}\Omega$	$f = 100\ \text{Hz}$
Differential Gate Current	$ I_{G1} - I_{G2} $		10		10	nA	$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$	$T_A = 125^\circ\text{C}$
Saturation Drain Current Ratio	I_{DSS1} / I_{DSS2}	0.9	1	0.85	1		$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	
Differential Gate Source Voltage	$ V_{GS1} - V_{GS2} $		20		25	mV	$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$	
Differential Gate Source Voltage with Temperature	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		6		8	mV	$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$	$T_A = 25^\circ\text{C}$ to -55°C
			7.5		10	mV	$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$	$T_A = 25^\circ\text{C}$ to 125°C
Transconductance Ratio	g_{fs1} / g_{fs2}	0.9	1	0.85	1		$V_{DS} = 20\text{V}$, $I_D = 200\ \mu\text{A}$	$f = 1\ \text{kHz}$



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TO-71 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate, 5 Source,
6 Drain, 7 Gate

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2N3993, 2N3993A

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- High Speed Commutators

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

25 V

Continuous Forward Gate Current

– 10 mA

Continuous Device Power Dissipation

300 mW

Power Derating

2.4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N3993		2N3993A		Process PJ99		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	25		25		V	$I_G = 1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	4	9.5	4	9.5	V	$V_{DS} = -10\text{V}$, $I_D = -1\ \mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	– 10		– 10		mA	$V_{DS} = -10\text{V}$, $V_{GS} = \emptyset\text{V}$	
Drain Reverse Current	I_{DGO}		– 1.2		– 1.2	nA	$V_{DG} = -15\text{V}$, $I_S = \emptyset\text{A}$	
			– 1.2		– 1.2	μA	$V_{DG} = -15\text{V}$, $I_S = \emptyset\text{A}$	$T_A = 150^\circ\text{C}$
Drain Cutoff Current	$I_{D(OFF)}$		– 1.2		– 1.2	nA	$V_{DS} = -10\text{V}$, $V_{GS} = 10\text{V}$	
			– 1		– 1	μA	$V_{DS} = -10\text{V}$, $V_{GS} = 10\text{V}$	$T_A = 150^\circ\text{C}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		150		150	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \emptyset\text{A}$	$f = 1\text{ kHz}$
Common Source Forward Transmittance	$ Y_{fs} $	6	12	7	12	mS	$V_{DS} = -10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		16		12	pF	$V_{DS} = -10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		4.5		3	pF	$V_{DS} = \emptyset$, $V_{GS} = 10\text{V}$	$f = 1\text{ MHz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Gate, 3 Drain, 4 Case



2N3994, 2N3994A

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- High Speed Commutators

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source Voltage	25 V
Reverse Gate Drain Voltage	25 V
Continuous Forward Gate Current	– 10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2.4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N3994		2N3994A		Process PJ99		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	25		25		V	$I_G = 1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	1	5.5	1	5.5	V	$V_{DS} = -10\text{V}$, $I_D = -1\ \mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	– 2		– 2		mA	$V_{DS} = -10\text{V}$, $V_{GS} = \emptyset\text{V}$	
Drain Reverse Current	I_{DGO}		– 1.2		– 1.2	nA	$V_{DG} = -15\text{V}$, $I_S = \emptyset\text{A}$	
			– 1.2		– 1.2	μA	$V_{DG} = -15\text{V}$, $I_S = \emptyset\text{A}$	$T_A = 150^\circ\text{C}$
Drain Cutoff Current	$I_{D(OFF)}$		– 1.2		– 1.2	nA	$V_{DS} = -10\text{V}$, $V_{GS} = 10\text{V}$	
			– 1		– 1	μA	$V_{DS} = -10\text{V}$, $V_{GS} = 10\text{V}$	$T_A = 150^\circ\text{C}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		300		300	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \emptyset\text{A}$	$f = 1\text{ kHz}$
Common Source Forward Transmittance	$ Y_{fs} $	4	10	5	10	mS	$V_{DS} = -10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		16		12	pF	$V_{DS} = -10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		5		3.5	pF	$V_{DS} = \emptyset$, $V_{GS} = 10\text{V}$	$f = 1\text{ MHz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Gate, 3 Drain, 4 Case



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2N4117, 2N4117A, 2N4118, 2N4118A, 2N4119, 2N4119A

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers
- Ultra-High Input Impedance Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 40 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

300 mW

Power Derating (to 175°C)2 mW/ $^\circ\text{C}$

At 25°C free air temperature:

Static Electrical Characteristics

		2N4117 2N4117A		2N4118 2N4118A		2N4119 2N4119A		Process NJ01	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40		– 40		– 40		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current 2N4117, 2N4118, 2N4119 2N4117A, 2N4118A, 2N4119A	I_{GSS}		– 10		– 10		– 10	pA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 1		– 1		– 1	pA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.6	– 1.8	– 1	– 3	– 2	– 6	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{nA}$
Drain Saturation Current (Pulsed) 2N4117, 2N4118, 2N4119 2N4117A, 2N4118A, 2N4119A	I_{GSS}	0.03	0.09	0.08	0.24	0.2	0.6	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$
		0.015	0.09	0.08	0.24	0.2	0.6	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	70	210	80	250	100	330	μS	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		3		5		10	μS	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		3		3		3	pF	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1.5		1.5		1.5	pF	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case



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

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- Oscillators
- VHF Amplifiers
- Small Signal Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 30 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating (to 150 °C)	2 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N4220 2N4220A		2N4221 2N4221A		2N4222 2N4222A			
		NJ16		NJ16		NJ32		Process	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 30		– 30		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1		– 0.1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 0.1		– 0.1		– 0.1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Voltage	V_{GS}	– 0.5 (50)	– 2.5 (50)	– 1 (200)	– 5 (200)	– 2 (500)	– 6 (500)	V μA	$V_{DS} = 15\text{V}$, $I_D = ()$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 4		– 6		– 8	V	$V_{DS} = 15\text{V}$, $I_D = 0.1\text{ nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	3	2	6	5	15	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	1000	4000	2000	5000	2500	6000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Forward Transmittance	$ Y_{fs} $	750		750		750		μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 100\text{ MHz}$
Common Source Output Conductance	g_{os}		10		20		40	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		6		6		6	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		2		2		2	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Noise Figure 2N4220A, 2N4221A, 2N4222A	NF		2.5		2.5		2.5	dB	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$ $R_G = 1\text{ M}\Omega$	$f = 100\text{ MHz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

2N4338, 2N4339

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers
- Small Signal Amplifiers
- Voltage-Controlled Resistors
- Current Limiters & Regulators

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 50 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

300 mW

Power Derating (to 175°C)2mW/ $^\circ\text{C}$ At 25°C free air temperature:

Static Electrical Characteristics

		2N4339		2N4339		Process NJ16	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$
			– 100		– 100	nA	$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3	– 1	– 0.6	– 1.8	V	$V_{DS} = 15\text{V}$, $I_D = 0.1\ \mu\text{A}$
Drain Saturation Current (Pulsed)	I_{DSS}	0.2	0.6	0.5	1.5	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$		0.05 (– 5)		0.05 (– 5)	nA V	$V_{DS} = 15\text{V}$, $V_{GS} = ()$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		2500		1700	Ω	$V_{GS} = 0\text{V}$, $I_D = 0\text{A}$	$f = 1\text{ kHz}$
Common Source Forward Transconductance	g_{fs}	600	1800	800	2400	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		5		15	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		7		7	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		3		3	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Noise Figure	NF		1		1	dB	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$ $R_G = 1\text{ M}\Omega$, BW = 200 Hz	$f = 1\text{ kHz}$

TO-18 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case



2N4340, 2N4341

N-Channel Silicon Junction Field-Effect Transistor

- Small Signal Amplifiers
- Current Regulators
- Voltage-Controlled Resistors

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage
 Continuous Forward Gate Current
 Continuous Device Power Dissipation
 Power Derating (to 175°C)

– 50 V
 50 mA
 300 mW
 2mW/ $^\circ\text{C}$

At 25°C free air temperature:

Static Electrical Characteristics

		2N4340		2N4341		Process NJ16	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$
			– 100		– 100	nA	$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$ $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 3	– 2	– 6	V	$V_{DS} = 15\text{V}$, $I_D = 0.1\ \mu\text{A}$
Drain Saturation Current (Pulsed)	I_{DSS}	1.2	3.6	3	9	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$		0.05 (– 5)		0.07 (– 10)	nA V	$V_{DS} = 15\text{V}$, $V_{GS} = ()$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		1500		800	Ω	$V_{GS} = 0\text{V}$, $I_D = 0\text{A}$	$f = 1\text{ kHz}$
Common Source Forward Transconductance	g_{fs}	1300	3000	2000	4000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		30		60	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		7		7	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		3		3	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Noise Figure	NF		1		1	dB	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$ $R_G = 1\text{ M}\Omega$, BW = 200 Hz	$f = 1\text{ kHz}$

TO-18 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMP4340, SMP4341



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2N4391, 2N4392, 2N4393

N-Channel Silicon Junction Field-Effect Transistor

- Low On Resistance Analog Switches
- Choppers
- Commutators

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 40 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

1.8 W

Power Derating

12 mW/°C

At 25°C free air temperature
Static Electrical Characteristics

		2N4391		2N4392		2N4393		Process NJ132	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40		– 40		– 40		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 100		– 100		– 100	pA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 200		– 200		– 200	nA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 2	– 5	– 0.5	– 3	V	$V_{DS} = -20\text{V}$, $I_D = 1\text{nA}$
Gate Source Forward Voltage	$V_{GS(F)}$		1		1		1	V	$I_G = 1\text{mA}$, $V_{DS} = \emptyset\text{V}$
Drain Saturation Current (Pulsed)	I_{DSS}	50	150	25	75	5	30	mA	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$						100	pA	$V_{DS} = 20\text{V}$, $V_{GS} = -5\text{V}$
							200	nA	$V_{DS} = 20\text{V}$, $V_{GS} = -5\text{V}$, $T_A = 150^\circ\text{C}$
					100			pA	$V_{DS} = 20\text{V}$, $V_{GS} = -7\text{V}$
					200			nA	$V_{DS} = 20\text{V}$, $V_{GS} = -7\text{V}$, $T_A = 150^\circ\text{C}$
			100					pA	$V_{DS} = 20\text{V}$, $V_{GS} = -12\text{V}$
			200					nA	$V_{DS} = 20\text{V}$, $V_{GS} = -12\text{V}$, $T_A = 150^\circ\text{C}$
Drain Source ON Voltage	$V_{DS(ON)}$						0.4	V	$V_{GS} = \emptyset\text{V}$, $I_D = 3\text{mA}$
					0.4			V	$V_{GS} = \emptyset\text{V}$, $I_D = 6\text{mA}$
			0.4					V	$V_{GS} = \emptyset\text{V}$, $I_D = 12\text{mA}$
Static Drain Source ON Resistance	$r_{DS(ON)}$		30		60		100	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = 1\text{mA}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		30		60		100	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \emptyset\text{A}$	$f = 1\text{kHz}$
Common Source Input Capacitance	C_{iss}		14		14		14	pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{kHz}$
Common Source Reverse Transfer Capacitance	C_{rss}						3.5	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -5\text{V}$	$f = 1\text{kHz}$
					3.5			pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -7\text{V}$	$f = 1\text{kHz}$
			3.5					pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -12\text{V}$	$f = 1\text{kHz}$

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$		15		15		15	ns	$V_{DD} = 10\text{V}$, $V_{GS(ON)} = \emptyset\text{V}$ 2N4391 2N4392 2N4393 $I_{D(ON)}$ 12 6 3 mA $V_{GS(OFF)}$ – 12 – 7 – 5 V
Rise Time	t_r		5		5		5	ns	
Turn OFF Delay Time	$t_{d(off)}$		20		35		50	ns	
Fall Time	t_f		15		20		30	ns	

TO-18 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMP4391, SMP4392, SMP4393



InterFET Corporation

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2N4416, 2N4416A

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- VHF Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	2N4416	– 30 V	2N4416A	– 35 V
Gate Current		10 mA		10 mA
Continuous Device Dissipation		300 mW		300 mW
Power Derating		2 mW/°C		2 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N4416		2N4416A		Process NJ26	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 35		V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$
			– 0.1		– 0.1	μA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 6	– 2.5	– 6	V	$V_{DS} = 15\text{V}$, $I_D = 1\text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	5	15	5	15	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	4500	7500	4500	7500	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
		4000		4000		μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Output Conductance	g_{os}		50		50	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
			75		75	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			100		100	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Input Capacitance	C_{iss}		4		4	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Output Capacitance	C_{oss}		2		2	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		0.8		0.8	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Input Conductance	g_{is}		100		100	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			1000		1000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Input Susceptance	b_{is}		2500		2500	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			10000		10000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Output Susceptance	b_{os}		1000		1000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			4000		4000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Power Gain	G_{ps}	18		18		dB	$V_{DS} = 15\text{V}$, $I_D = 5\text{mA}$	$f = 100\text{ MHz}$
		10		10		dB	$V_{DS} = 15\text{V}$, $I_D = 5\text{mA}$	$f = 400\text{ MHz}$
Noise Figure	NF		2		2	dB	$V_{DS} = 15\text{V}$, $I_D = 5\text{mA}$	$f = 100\text{ MHz}$
			4		4	dB	$R_G = 1\text{k}\Omega$	$f = 400\text{ MHz}$

TO-72 Package

See Section G for Outline Dimensions

Surface Mount

SMP4416, SMP4416A

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

Note: rf parameters guaranteed, but not 100% tested.

2N4856, 2N4857, 2N4858, 2N4859, 2N4860, 2N4861

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

	2N4856, 2N4857, 2N4858	2N4859, 2N4860, 2N4861
Reverse Gate Source Voltage	– 40 V	– 30 V
Reverse Gate Drain Voltage	– 40 V	– 30 V
Continuous Device Dissipation	1.8 W	1.8 W
Power Derating	10 mW/°C	10 mW/°C
Continuous Forward Gate Current	50 mA	50 mA

At 25°C free air temperature:

Static Electrical Characteristics

		2N4856 2N4859		2N4857 2N4860		2N4858 2N4861		Process NJ132	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861	$V_{(BR)GSS}$		– 40		– 40		– 40	V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
			– 30		– 30		– 30	V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current 2N4856, 2N4857, 2N4858	I_{GSS}		– 250		– 250		– 250	pA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$
			– 500		– 500		– 500	nA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$, $T_A = 150^\circ\text{C}$
Gate Reverse Current 2N4859, 2N4860, 2N4861	I_{GSS}		– 250		– 250		– 250	pA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$
			– 500		– 500		– 500	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 2	– 6	– 0.8	– 4	V	$V_{DS} = 15\text{V}$, $I_D = 0.5\text{ nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	50		20	100	8	80	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$		250		250		250	pA	$V_{DS} = 15\text{V}$, $V_{GS} = -10\text{V}$
			500		500		500	nA	$V_{DS} = 15\text{V}$, $V_{GS} = -10\text{V}$, $T_A = 150^\circ\text{C}$
Drain Source ON Voltage	$V_{DS(ON)}$		0.75 (20)		0.5 (10)		0.5 (5)	V (mA)	$V_{GS} = 0\text{V}$, $I_D = ()$

Dynamic Electrical Characteristics

Common Source ON Resistance	$r_{ds(on)}$		25		40		60	Ω	$V_{GS} = 0\text{V}$, $I_D = 0\text{A}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		18		18		18	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		8		8		8	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$		6 (20) [–10]		6 (10) [– 6]		10 (5) [– 4]	ns (mA) [V]	$V_{DD} = 10\text{V}$, $V_{GS} = 0\text{V}$ $I_{D(ON)} = ()$ $V_{GS(OFF)} = []$ (2N4856, 2N4859) $R_L = 465\Omega$ (2N4857, 2N4860) $R_L = 953\Omega$ (2N4858, 2N4861) $R_L = 1910\Omega$
Rise Time	t_r		3 (20) [–10]		4 (10) [– 6]		10 (5) [– 4]	ns (mA) [V]	
Turn OFF Delay Time	$t_{d(off)}$		25 (20) [–10]		50 (10) [– 6]		100 (5) [– 4]	ns (mA) [V]	

TO-18 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMP4856, SMP4857, SMP4858,
SMP4859, SMP4860, SMP4861



2N4856A, 2N4857A, 2N4858A, 2N4859A, 2N4860A, 2N4861A

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

	2N4856A, 2N4857A, 2N4858A	2N4859A, 2N4860A, 2N4861A
Reverse Gate Source Voltage	– 40 V	– 30 V
Reverse Gate Drain Voltage	– 40 V	– 30 V
Continuous Device Dissipation	1.8 W	1.8 W
Continuous Forward Gate Current	50 mA	50 mA
Power Derating	10 mW/°C	10 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N4856A 2N4859A		2N4857A 2N4860A		2N4858A 2N4861A		Process NJ132	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage 2N4856A, 2N4857A, 2N4858A	$V_{(BR)GSS}$		– 40		– 40		– 40	V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Source Breakdown Voltage 2N4859A, 2N4860A, 2N4861A	$V_{(BR)GSS}$		– 30		– 30		– 30	V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current 2N4856A, 2N4857A, 2N4858A	I_{GSS}		– 250		– 250		– 250	pA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$
			– 500		– 500		– 500	nA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$, $T_A = 150^\circ\text{C}$
Gate Reverse Current 2N4859A, 2N4860A, 2N4861A	I_{GSS}		– 250		– 250		– 250	pA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$
			– 500		– 500		– 500	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 2	– 6	– 0.8	– 4	V	$V_{DS} = 15\text{V}$, $I_D = 0.5\text{ nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	50		20	100	8	80	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$		250		250		250	pA	$V_{DS} = 15\text{V}$, $V_{GS} = -10\text{V}$
			500		500		500	nA	$V_{DS} = 15\text{V}$, $V_{GS} = -10\text{V}$, $T_A = 150^\circ\text{C}$
Drain Source ON Voltage	$V_{DS(ON)}$		0.75 (20)		0.5 (10)		0.5 (5)	V (mA)	$V_{GS} = 0\text{V}$, $I_D = ()$

Dynamic Electrical Characteristics

Common Source ON Resistance	$r_{ds(on)}$		25		40		60	Ω	$V_{GS} = 0\text{V}$, $I_D = 0\text{A}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		10		10		10	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		4		3.5		3.5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$		5 (20) [–10]		6 (10) [– 6]		8 (5) [– 4]	ns (mA) [V]	$V_{DD} = 10\text{V}$, $V_{GS} = 0\text{V}$ $I_{D(ON)} = ()$ $V_{GS(OFF)} = []$ (2N4856A, 2N4859A) $R_L = 464\Omega$ (2N4857A, 2N4860A) $R_L = 953\Omega$ (2N4858A, 2N4861A) $R_L = 1910\Omega$
Rise Time	t_r		3 (20) [–10]		4 (10) [– 6]		8 (5) [– 4]	ns (mA) [V]	
Turn OFF Delay Time	$t_{d(off)}$		25 (20) [–10]		40 (10) [– 6]		80 (5) [– 4]	ns (mA) [V]	

TO-18 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMP4856A, SMP4857A, SMP4858A,
SMP4859A, SMP4860A, SMP4861A



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2N4867, 2N4867A, 2N4868, 2N4868A, 2N4869, 2N4869A

N-Channel Silicon Junction Field-Effect Transistor

• Audio Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 40 V
Gate Current	50 mA
Continuous Device Power Dissipation	300mW
Power Derating	1.7 mW/°C
Storage Temperature Range	– 65°C to + 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N4867 2N4867A		2N4868 2N4868A		2N4869 2N4869A		Process NJ16		
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40		– 40		– 40		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.25		– 0.25		– 0.25	nA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$	
			– 0.25		– 0.25		– 0.25	μA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.7	– 2	– 1	– 3	– 1.8	– 5	V	$V_{DS} = 20\text{V}$, $I_D = 1\mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	0.4	1.2	1	3	2.5	7.5	mA	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	700	2000	1000	3000	1300	4000	μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		1.5		4		10	μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		25		25		25	pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		5		5		5	pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20		20	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 10\text{ Hz}$
			10		10		10	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Noise Figure	NF		1		1		1	dB	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
									(2N4867, 68, 69) $R_G = 20\text{ k}\Omega$ (2N4867A, 68A, 69A) $R_G = 5\text{ k}\Omega$	

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

Surface Mount

SMP4867, SMP4867A, SMP4868,
SMP4868A, SMP4869, SMP4869A



2N5020, 2N5021

P-Channel Silicon Junction Field-Effect Transistor

• Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 50 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	500 mW
Power Derating	4 mW/°C
Storage Temperature Range	– 65°C to + 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N5020		2N5021		Process PJ32		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GDO}$	25		25		V	$I_G = 1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		1		1	nA	$V_{GS} = 15\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	0.3	1.5	0.5	2.5	V	$V_{DS} = -15\text{V}$, $I_D = 1\text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	– 0.3	– 1.2	– 1	– 3.5	mA	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	1	3.5	1.5	6	mS	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	
Common Source Output Conductance	g_{os}		20		20	μS	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	
Common Source Input Capacitance	C_{iss}		25		25	pF	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		7		7	pF	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	f = 1 MHz

TO-18 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source 1, 2 Gate & Case, 3 Drain

Surface Mount

SMP5020, SMP5021



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2N5114, 2N5115, 2N5116

P-Channel Silicon Junction Field-Effect Transistor

• Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 40 V
Gate Current	50 mA
Continuous Device Power Dissipation	500mW
Power Derating	3 mW/°C
Storage Temperature Range	– 65°C to + 200°C

At 25°C free air temperature:
Static Electrical Characteristics

		2N5114		2N5115		2N5116		Process PJ99	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		30		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		500		500		500	pA	$V_{GS} = 20\text{V}$, $V_{DS} = \emptyset\text{V}$
			1		1		1	μA	$V_{GS} = 20\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	5	10	3	6	1	4	V	$V_{DS} = -15\text{V}$, $I_G = -1\text{nA}$
Gate Source Forward Voltage	$V_{GS(F)}$		– 1		– 1		– 1	V	$V_{DS} = \emptyset\text{V}$, $I_G = -1\text{mA}$
Drain Saturation Current (Pulsed)	I_{DSS}	– 30	– 90					mA	$V_{GS} = \emptyset\text{V}$, $V_{DS} = -18\text{V}$
				– 15	– 60	– 5	– 25	mA	$V_{GS} = \emptyset\text{V}$, $V_{DS} = -15\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$		– 500					pA	$V_{DS} = -15\text{V}$, $V_{GS} = 12\text{V}$
			– 1					μA	$V_{DS} = -15\text{V}$, $V_{GS} = 12\text{V}$, $T_A = 150^\circ\text{C}$
					– 500			pA	$V_{DS} = -15\text{V}$, $V_{GS} = 7\text{V}$
					– 1			μA	$V_{DS} = -15\text{V}$, $V_{GS} = 7\text{V}$, $T_A = 150^\circ\text{C}$
						– 500		pA	$V_{DS} = -15\text{V}$, $V_{GS} = 5\text{V}$
						– 1		μA	$V_{DS} = -15\text{V}$, $V_{GS} = 5\text{V}$, $T_A = 150^\circ\text{C}$
Drain Source ON Voltage	$V_{DS(ON)}$		– 1.3					V	$V_{GS} = \emptyset\text{V}$, $I_D = -15\text{mA}$
					– 0.8			V	$V_{GS} = \emptyset\text{V}$, $I_D = -7\text{mA}$
						– 0.6		V	$V_{GS} = \emptyset\text{V}$, $I_D = -3\text{mA}$
Static Drain Source ON Resistance	$r_{DS(ON)}$		75		100		150	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = -1\text{mA}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		75		100		150	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \emptyset\text{A}$	$f = 1\text{kHz}$
Common Source Input Capacitance	C_{iss}		25		25		27	pF	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		7					pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = 12\text{V}$	$f = 1\text{MHz}$
					7			pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = 7\text{V}$	$f = 1\text{MHz}$
							7	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = 5\text{V}$	$f = 1\text{MHz}$

Switching Characteristics

		2N5114	2N5115	2N5116				
Turn ON Delay Time	$t_{d(on)}$		6		10		25	ns
Rise Time	t_r		10		20		35	ns
Turn OFF Delay Time	$t_{d(off)}$		6		8		20	ns
Fall Time	t_f		15		30		60	ns
		V_{DD}	– 10	– 6	– 6			V
		V_{GG}	20	12	8			V
		R_L	130	910	2000			Ω
		R_G	100	220	390			Ω
		$I_{D(ON)}$	– 15	– 7	– 3			mA

TO-18 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Gate & Case, 3 Drain



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2N5397, 2N5398

N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise
- High Power Gain
- High Transconductance
- Mixers
- Oscillators
- VHF Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 25 V
Drain Source Voltage	25 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	1.7 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N5397		2N5398		Process NJ26L	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Source Forward Voltage	$V_{GS(F)}$		1		1	V	$I_G = 1\ \text{mA}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 0.1		– 0.1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 6	– 1	– 6	V	$V_{DS} = 10\text{V}$, $I_D = 1\ \text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	10	30	5	40	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	5.5	9	5	10	mS	$V_{DG} = 10\text{V}$, $I_D = 10\ \text{mA}$	$f = 450\ \text{MHz}$
Common Source Forward Transfer Admittance	$ Y_{fs} $	6	10	5.5	10	mS	$V_{DS} = 10\text{V}$, $I_D = 10\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Output Conductance	$ g_{os} $		0.4		0.5	mS	$V_{DG} = 10\text{V}$, $I_D = 10\ \text{mA}$	$f = 450\ \text{MHz}$
Common Source Input Admittance	$ Y_{os} $		0.2		0.4	mS	$V_{DS} = 10\text{V}$, $I_D = 10\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Conductance	g_{is}		2		3	mS	$V_{DG} = 10\text{V}$, $I_D = 10\ \text{mA}$	$f = 450\ \text{MHz}$
Common Source Input Capacitance	C_{iss}		5		5.5	pF	$V_{DG} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.3	pF	$V_{DG} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

Surface Mount

SMP5397, SMP5398



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2N5460, 2N5461, 2N5462

P-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers
- General Purpose Amplifiers

Absolute maximum ratings at 25 °C

Reverse Gate Source & Reverse Gate Drain Voltage
 Continuous Forward Gate Current
 Continuous Device Power Dissipation
 Power Derating

40 V
 – 10 mA
 310 mW
 2.8 mW/°C

At 25°C free air temperature:
 Static Electrical Characteristics

		2N5460		2N5461		2N5462		Process PJ32		
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	40		40		40		V	$I_G = 10 \mu A$, $V_{DS} = \emptyset V$	
Gate Reverse Current	I_{GSS}		5		5		5	nA	$V_{GS} = 20 V$, $V_{DS} = \emptyset V$	
			1		1		1	μA	$V_{GS} = 20 V$, $V_{DS} = \emptyset V$	$T_A = 100^\circ C$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	0.75	6	1	7.5	1.8	9	V	$V_{DS} = -15 V$, $I_D = -1 \mu A$	
Gate Source Voltage	V_{GS}	0.8	4.5					V	$V_{DS} = -15 V$, $I_D = -100 \mu A$	
				0.8	4.5			V	$V_{DS} = -15 V$, $I_D = -200 \mu A$	
						1.5	6	V	$V_{DS} = -15 V$, $I_D = -400 \mu A$	
Drain Saturation Current (Pulsed)	I_{DSS}	– 1	– 5	– 2	– 9	– 4	– 16	mA	$V_{DS} = -15 V$, $V_{GS} = \emptyset V$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		2		0.8		0.4	k Ω	$V_{GS} = \emptyset V$, $I_D = \emptyset A$	$f = 1 \text{ kHz}$
Common Source Forward Transadmittance	$ Y_{fs} $	1	4	1.5	5	2	6	mS	$V_{DS} = -15 V$, $V_{GS} = \emptyset V$	$f = 1 \text{ kHz}$
Common Source Output Admittance	$ Y_{os} $		75		75		75	μS	$V_{DS} = -15 V$, $V_{GS} = \emptyset V$	$f = 1 \text{ kHz}$
Common Source Input Capacitance	C_{iss}		7		7		7	pF	$V_{DS} = -15 V$, $V_{GS} = \emptyset V$	$f = 1 \text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		2		2		2	pF	$V_{DS} = -15 V$, $V_{GS} = \emptyset V$	$f = 1 \text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		2.5		2.5		2.5	dB	$V_{DS} = -15 V$, $V_{GS} = \emptyset V$	$f = 100 \text{ Hz}$, $BW = 1 \text{ Hz}$
Noise Figure	NF		115		115		115	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = -15 V$, $V_{GS} = \emptyset V$, $R_G = 1 M\Omega$	$f = 100 \text{ Hz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMP5460, SMP5461, SMP5462



2N5484, 2N5485, 2N5486

N-Channel Silicon Junction Field-Effect Transistor

• VHF/UHF Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source Voltage	– 25 V
Reverse Gate Drain Voltage	– 25 V
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

		2N5484		2N5485		2N5486		Process NJ26	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		– 25		V	$I_G = 1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 1		– 1		– 1	nA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 0.2		– 0.2		– 0.2	μA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 100^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3	– 3	– 0.5	– 4	– 2	– 6	V	$V_{DS} = 15\text{V}$, $I_D = 10\text{ nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	1	5	4	10	8	20	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Forward Transconductance	$R_e(Y_{fs})$	2500						μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 100\text{ MHz}$
				3000		3500		μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 400\text{ MHz}$
Common Source Forward Transadmittance	Y_{fs}	3000	6000	3500	7000	4000	8000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Input Admittance	$R_e(Y_{is})$		100					μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 100\text{ MHz}$
					1000		1000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 400\text{ MHz}$
Output Conductance	$R_e(Y_{os})$		75					μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 100\text{ MHz}$
					100		100	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 400\text{ MHz}$
Common Source Output Admittance	Y_{os}		50		60		75	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Input Capacitance	C_{iss}		5		5		5	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1		1		1	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Output Capacitance	C_{oss}		2		2		2	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMP5484, SMP5485, SMP5486



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2N5911, 2N5912

Dual N-Channel Silicon Junction Field-Effect Transistor

• Wideband Differential Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Continuous Forward Gate Current	50 mA
Total Device Power Dissipation	500 mW
Power Derating	4 mW/°C
Storage Temperature Range	-65°C to + 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N5911		2N5912		Process NJ30L or NJ36D		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	- 25		- 25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		- 100		- 100	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
			- 250		- 250	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 150^\circ\text{C}$
Gate Operating Current	I_G		- 100		- 100	pA	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	
			- 100		- 100	nA	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$T_A = 125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	- 1	- 5	- 1	- 5	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{nA}$	
Gate Source Voltage	V_{GS}	- 0.3	- 4	- 0.3	- 4	V	$V_{DS} = 10\text{V}$, $I_D = 5\text{mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	7	40	7	40	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	5000	10000	5000	10000	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 1\text{kHz}$
		5000	10000	5000	10000	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 100\text{MHz}$
Common Source Output Conductance	g_{os}		100		100	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 1\text{kHz}$
			150		150	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 100\text{MHz}$
Common Source Input Capacitance	C_{iss}		5		5	pF	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 1\text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 1\text{MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20	nV/√Hz	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 10\text{kHz}$
Noise Figure	NF		1		1	dB	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$ $R_G = 100\text{K}\Omega$	$f = 10\text{kHz}$
Differential Gate Current	$I_{G1} - I_{G2}$		20		20	nA	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$T_A = 125^\circ\text{C}$
Saturation Drain Current Ratio	I_{DSS1} / I_{DSS2}	0.95	1	0.95	1		$V_{DG} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	
Differential Gate Source Voltage	$ V_{GS1} - V_{GS2} $		10		15	mV	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	
Gate Source Voltage Differential Drift	$\Delta V_{GS1} - V_{GS2}$ ΔT		20		40	mV	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$T_A = 25^\circ\text{C}$, $T_B = 125^\circ\text{C}$
			20		40	mV	$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$T_A = -55^\circ\text{C}$, $T_B = 25^\circ\text{C}$
Transconductance Ratio	g_{fs1} / g_{fs2}	0.9	1	0.85	1		$V_{DG} = 10\text{V}$, $I_D = 5\text{mA}$	$f = 1\text{kHz}$

SOIC-8 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Drain 1, 3 Gate 1, 4 N/C,
5 Source 2, 6 Drain 2, 7 Gate 2, 8 Omitted

TO-78 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Drain 1, 3 Gate 1,
4 Case, 5 Source 2, 6 Drain 2,
7 Gate 2, 8 Omitted

Surface Mount

SMP5911, SMP5912



2N6449, 2N6450

N-Channel Silicon Junction Field-Effect Transistor

• High Voltage

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

	2N6449	2N6450
Reverse Gate Source Voltage	– 300 V	– 200 V
Reverse Gate Drain Voltage	– 300 V	– 200 V
Continuous Forward Gate Current	10 mA	10 mA
Continuous Device Power Dissipation	800 mW	800 mW
Power Derating	6.4 mW/°C	6.4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N6449		2N6450		Process NJ42	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 300		– 200		V	$I_G = -10\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 100			nA	$V_{GS} = -150\text{V}$, $V_{DS} = \emptyset\text{V}$
					– 100	nA	$V_{GS} = -100\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 100			μA	$V_{GS} = -150\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 150^\circ\text{C}$
					– 100	μA	$V_{GS} = -100\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2	– 15	– 2	– 15	V	$V_{DS} = 30\text{V}$, $I_D = 4\ \text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	2	10	2	10	mA	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transfer Admittance	Y_{fs}	0.5	3	0.5	3	mS	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Output Conductance	Y_{os}		100		100	μS	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		20		20	pF	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		2.5		2.5	pF	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$

TO-39 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

2N6451, 2N6452

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers
- Low-Noise, High Gain Amplifiers
- Low-Noise Preamplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

	2N6451	2N6452
Reverse Gate Source Voltage	– 20 V	– 25 V
Reverse Gate Drain Voltage	– 20 V	– 25 V
Continuous Forward Gate Current	10 mA	10 mA
Continuous Device Power Dissipation	360 mW	360 mW
Power Derating	2.88 mW/°C	2.88 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N6451		2N6452		Process NJ132L	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		– 25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		– 0.1			nA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$
					– 0.5	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 0.2			μA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 125^\circ\text{C}$
					– 1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5	– 3.5	– 0.5	– 3.5	V	$V_{DS} = 10\text{V}$, $I_D = 0.5\ \text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	5	20	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transmittance	$ Y_{fs} $	15	30	15	30	mS	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
						mS	$V_{DS} = 10\text{V}$, $I_D = 15\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Output Conductance	$ Y_{os} $		50		50	μS	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
						μS	$V_{DS} = 10\text{V}$, $I_D = 15\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		25		25	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
						pF	$V_{DS} = 10\text{V}$, $I_D = 15\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		5		5	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
						pF	$V_{DS} = 10\text{V}$, $I_D = 15\ \text{mA}$	$f = 1\ \text{kHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5		10	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 10\ \text{kHz}$
			3		8	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Noise Figure	NF		1.5		2.5	dB	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$ $R_G = 10\ \text{k}\Omega$	$f = 10\ \text{Hz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case



2N6453, 2N6454**N-Channel Silicon Junction Field-Effect Transistor**

- Audio Amplifiers
- Low-Noise, High Gain Amplifiers
- Low-Noise Preamplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

	2N6453	2N6454
Reverse Gate Source Voltage	- 20 V	- 25 V
Reverse Gate Drain Voltage	- 20 V	- 25 V
Continuous Forward Gate Current	10 mA	10 mA
Continuous Device Power Dissipation	360 mW	360 mW
Power Derating	2.88 mW/°C	2.88 mW/°C

At 25°C free air temperature:**Static Electrical Characteristics**

		2N6453		2N6454		Process NJ132L	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	- 20		- 25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}		- 0.1			nA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$
					- 0.5	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$
			- 0.2			μA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$
					- 1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	- 0.75	- 5	- 0.75	- 5	V	$V_{DS} = 10\text{V}$, $I_D = 0.5\text{ nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	15	50	15	50	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transmittance	$ Y_{fs} $					mS	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$
		20	40	20	40	mS	$V_{DS} = 10\text{V}$, $I_D = 15\text{ mA}$	$f = 1\text{ kHz}$
Common Source Output Conductance	$ Y_{os} $					μS	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$
			100		100	μS	$V_{DS} = 10\text{V}$, $I_D = 15\text{ mA}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}					pF	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$
			25		25	pF	$V_{DS} = 10\text{V}$, $I_D = 15\text{ mA}$	$f = 1\text{ kHz}$
Common Source Reverse Transfer Capacitance	C_{rss}					pF	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$
			5		5	pF	$V_{DS} = 10\text{V}$, $I_D = 15\text{ mA}$	$f = 1\text{ kHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5		10	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 10\text{ kHz}$
			3		8	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$
Noise Figure	NF		1.5		2.5	dB	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$ $R_G = 10\text{ k}\Omega$	$f = 10\text{ Hz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

2N6550

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	400 mW
Power Derating	2.3 mW/°C
Junction Temperature (Operating & Storage)	– 65°C to +200°C

At 25°C free air temperature:

Static Electrical Characteristics

		2N6550			Process NJ450L		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20			V	$I_G = 10\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Leakage Current	I_{GSS}			– 3	nA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$	
				– 0.1	μA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 85^\circ\text{C}$
Zero Gate Voltage Drain Current (Pulsed)	I_{DSS}	10	100	250	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3		– 3	V	$V_{DS} = 10\text{V}$, $I_D = 0.1\text{ mA}$	

Dynamic Electrical Characteristics

Transconductance	g_{fs}	25		150	mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Common Source Output Conductance	$ Y_{os} $			150	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		30	35	pF	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 140\text{ kHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		10	20	pF	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 140\text{ kHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		1.4	2	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 5\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
			6	10	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 5\text{V}$, $I_D = 10\text{ mA}$	$f = 10\text{ Hz}$
	$\bar{e}_N$ Total		0.4	0.6	μVrms	$V_{DS} = 5\text{V}$, $I_D = 10\text{ mA}$	$f = 10\text{ kHz}$ to 20 kHz
Equivalent Open Circuit Input Noise Current	$\bar{i}_N$		0.1		pA/ $\sqrt{\text{Hz}}$	$R_S < 100\text{ K}\Omega$	$f = 1\text{ kHz}$

TO-46 Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate & Case



IF140, IF140A

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	375 mW
Power Derating	3 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF140		IF140A		Process NJ14AL	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$
			– 0.2		– 0.2	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$ $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 6		– 6	V	$V_{DS} = 15\text{V}$, $I_D = 5\text{ nA}$
Gate Source Voltage	V_{GS}		– 5	– 2.5	– 6	V	$V_{DS} = 15\text{V}$, $I_D = 50\ \mu\text{A}$
Gate Source Forward Voltage	$V_{GS(F)}$		1		1	V	$V_{DS} = 0$, $I_G = 1\text{ mA}$
Drain Saturation Current (Pulsed)	I_{DSS}	5	15	5	15	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transmittance	Y_{fs}	4.5		4.5		mS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	Y_{os}		0.05		0.05	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		3		3	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		0.6		0.6	pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$

Typ

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	4	4	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 12\text{V}$, $V_{GS} = 0\text{V}$	$f = 10\text{ Hz}$
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TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	375 mW
Power Derating	3 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF142		Process NJ14AL		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
			– 0.2	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 6	V	$V_{DS} = 15\text{V}$, $I_D = 5\text{ nA}$	
Gate Source Voltage	V_{GS}		– 5	V	$V_{DS} = 15\text{V}$, $I_D = 50\ \mu\text{A}$	
Gate Source Forward Voltage	$V_{GS(F)}$		1	V	$V_{DS} = \emptyset$, $I_G = 1\text{ mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5	15	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transmittance	Y_{fs}	3.5		mS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	Y_{os}		0.05	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		3	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		0.6	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	4	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 12\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 10\text{ Hz}$
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TO-236AB Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate



IF1320

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	225 mW
Power Derating	1.8 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF1320		Process NJ132L		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	$V_{DS} = 10\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	15		mS	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		20	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		5	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	2.5	nV/√Hz	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
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TO-236AB Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate



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IF1330

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	225 mW
Power Derating	1.8 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF1330		Process NJ132H		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	$V_{DS} = 10\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	10		mS	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		20	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		5	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	2.5		nV/√Hz	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
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TO-236AB Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate



IF1331

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	225 mW
Power Derating	1.8 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF1331		Process NJ132H		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	$V_{DS} = 10\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	10		mS	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		20	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		5	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	2.5	nV/√Hz	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
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TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case



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IF1801

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings = T_A at 25 °C

Reverse Gate Source Voltage & Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF1801		Process NJ1800DL		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1 \mu A$, $V_{DS} = \emptyset V$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -10 V$, $V_{DS} = \emptyset V$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 2	V	$V_{DS} = 10 V$, $I_D = 0.5 nA$	
Drain Saturation Current (Pulsed)	I_{DSS}	30		mA	$V_{DS} = 10 V$, $V_{GS} = \emptyset V$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	50		mS	$V_{DS} = 10 V$, $I_D = 5 mA$	$f = 1 kHz$
Common Source Input Capacitance	C_{iss}		100	pF	$V_{DS} = 10 V$, $I_D = 5 mA$	$f = 1 MHz$
Common Source Reverse Transfer Capacitance	C_{rss}		50	pF	$V_{DS} = 10 V$, $I_D = 5 mA$	$f = 1 MHz$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.5		nV/ $\sqrt{Hz}$	$V_{DG} = 4 V$, $I_D = 5 mA$	$f = 1 kHz$
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TO-52 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case



IF3601

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings = T_A at 25°C

Reverse Gate Source Voltage & Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF3601		Process NJ3600L		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1 \mu A$, $V_{DS} = \emptyset V$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -10 V$, $V_{DS} = \emptyset V$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 2	V	$V_{DS} = 10 V$, $I_D = 0.5 nA$	
Drain Saturation Current (Pulsed)	I_{DSS}	30		mA	$V_{DS} = 10 V$, $V_{GS} = \emptyset V$	

Dynamic Electrical Characteristics

Typ

Common Source Forward Transconductance	g_{fs}	750	mS	$V_{DS} = 10 V$, $V_{GS} = \emptyset V$	$f = 1 kHz$
Common Source Input Capacitance	C_{iss}	300	pF	$V_{DS} = \emptyset V$, $V_{GS} = -4 V$	$f = 1 MHz$
Common Source Reverse Transfer Capacitance	C_{rss}	200	pF	$V_{DS} = \emptyset V$, $V_{GS} = -4 V$	$f = 1 MHz$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.3	nV/ $\sqrt{Hz}$	$V_{DG} = 3 V$, $I_D = 5 mA$	$f = 100 Hz$

TO-39 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case



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Dual N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings = T_A at 25 °C

Reverse Gate Source Voltage & Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	4 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF3602		Process NJ3600L		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1 \mu A, V_{DS} = \emptyset V$	
Gate Reverse Current	I_{GSS}		– 0.5	nA	$V_{GS} = -10 V, V_{DS} = \emptyset V$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 3	V	$V_{DS} = 10 V, I_D = 0.5 nA$	
Drain Saturation Current (Pulsed)	I_{DSS}	30		mA	$V_{DS} = 10 V, V_{GS} = \emptyset V$	

Dynamic Electrical Characteristics

Typ

Common Source Forward Transconductance	g_{fs}	750	mS	$V_{DS} = 10 V, V_{GS} = \emptyset V$	$f = 1 \text{ kHz}$
Common Source Input Capacitance	C_{iss}	300	pF	$V_{DS} = \emptyset V, V_{GS} = -4 V$	$f = 1 \text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}	200	pF	$V_{DS} = \emptyset V, V_{GS} = -4 V$	$f = 1 \text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.3	nV/ $\sqrt{\text{Hz}}$	$V_{DG} = 3 V, I_D = 5 \text{ mA}$	$f = 100 \text{ Hz}$

Max

Differential Gate Source Voltage	$ V_{GS1} - V_{GS2} $	100	mV	$V_{DS} = 10 V, V_{GS} = \emptyset V$	
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TO-78 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Omitted,
5 Source, 6 Drain, 7 Gate, 8 Omitted



IF4500

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	225 mW
Power Derating	1.8 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF4500		Process NJ450L		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	$V_{DS} = 15\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	15		mS	$V_{DS} = 15\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		35	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		8	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/√Hz	$V_{DS} = 12\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
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TO-236AB Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate



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IF4501

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2.4 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF4501		Process NJ450L		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	$V_{DS} = 10\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	15		mS	$V_{DS} = 15\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		35	pF	$V_{DS} = 15\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		9	pF	$V_{DS} = 15\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/ $\sqrt{\text{Hz}}$	$V_{DG} = 12\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
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TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case



IF4510

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	1.8 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF4510		Process NJ450H		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	$V_{DS} = 15\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	15		mS	$V_{DS} = 15\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		35	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		8	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/√Hz	$V_{DG} = 12\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
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TO-236AB Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate



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IF4511

N-Channel Silicon Junction Field-Effect Transistor

• Audio Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	1.8 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF4511		Process NJ450H		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	$V_{DS} = 15\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	15		mS	$V_{DS} = 15\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		35	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		8	pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/ $\sqrt{\text{Hz}}$	$V_{DG} = 12\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
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TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case



IF9030

N-Channel Silicon Junction Field-Effect Transistor

• Low-Noise, High Gain Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2.4 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IF9030		Process NJ903L		
		Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 0.1	nA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 2	V	$V_{DS} = 10\text{V}$, $I_D = 0.5\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	30	300	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	80		mS	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		60	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		20	pF	$V_{DS} = 10\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{MHz}$

Typ

Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.5	nV/√Hz	$V_{DG} = 4\text{V}$, $I_D = 5\ \text{mA}$	$f = 1\ \text{kHz}$
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TO-52 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

IFN421, IFN422, IFN423

Dual N-Channel Silicon Junction Field-Effect Transistor

- Very High Input Impedance Differential Amplifiers
- Electrometers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Device Dissipation (Derate 3.2 mW/°C to 50°C)	400 mW
Total Device Dissipation (Derate 6 mW/°C to 150°C)	750 mW
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IFN421, IFN422, IFN423			Process NJ01		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40	– 60		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$	
Gate to Gate Breakdown Voltage	BV_{G1G2}	± 40			V	$I_G = -1\ \mu\text{A}$, $I_D = 0\text{A}$, $I_S = 0\text{A}$	
Gate Reverse Current	I_{GSS}			– 1	pA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$	
				– 1	nA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$	$T_A = +125^\circ\text{C}$
Gate Operating Current	I_G			– 0.25	pA	$V_{DS} = 10\text{V}$, $I_D = 30\ \mu\text{A}$	
				– 250	pA	$V_{DS} = 10\text{V}$, $I_D = 30\ \mu\text{A}$	$T_A = +125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.4		– 2	V	$V_{DS} = 10\text{V}$, $I_D = 1\ \text{nA}$	
Gate Source Voltage	V_{GS}			– 1.8	V	$V_{DS} = 10\text{V}$, $I_D = 30\ \mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	60		1000	μA	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	100		1500	μS	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\ \text{kHz}$
Common Source Output Conductance	g_{os}			3	μS	$V_{DS} = 10\text{V}$, $I_D = 30\ \mu\text{A}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}			3	pF	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}			1.5	pF	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\ \text{MHz}$
Equivalent Circuit Input Noise Voltage	$\bar{e}_N$		20	70	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $I_D = 30\ \mu\text{A}$	$f = 10\ \text{Hz}$
Noise Figure	NF			1	dB	$V_{DS} = 10\text{V}$, $I_D = 30\ \mu\text{A}$ $R_G = 10\ \text{M}\Omega$	$f = 10\ \text{Hz}$

Max - IFN421 IFN422 IFN423

Differential Gate Source Voltage	$ V_{GS1} - V_{GS2} $	10	15	25	mV	$V_{DG} = 10\text{V}$, $I_D = 30\ \mu\text{A}$	
Differential Gate Source Voltage With Temperature	$\frac{ V_{GS1} - V_{GS2} }{\Delta T}$	10	25	40	$\mu\text{V}/^\circ\text{C}$	$V_{DG} = 10\text{V}$, $I_D = 30\ \mu\text{A}$	$T_A = -55^\circ\text{C}$ $T_B = 25^\circ\text{C}$ $T_C = 125^\circ\text{C}$

Min - IFN421 IFN422 IFN423

Common Mode Rejection Ratio	CMRR	90	80	80	dB	$V_{DG} = 10\text{V to } 20\text{V}$, $I_D = 30\ \mu\text{A}$	
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TO-78 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Drain 1, 3 Gate 1, 4 Case,
5 Source 2, 6 Drain 2, 7 Gate 2,
8 Omitted



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IFN424, IFN425, IFN426

Dual N-Channel Silicon Junction Field-Effect Transistor

- Very High Impedance Differential Amplifiers
- Electrometers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Device Dissipation (Derate 3.2 mW/°C to 50°C)	400 mW
Total Device Dissipation (Derate 6 mW/°C to 150 °C)	750 mW
Storage Temperature Range	- 60 °C to 200 °C

At 25°C free air temperature:

Static Electrical Characteristics

		IFN424, IFN425, IFN426			Process NJ01		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	- 40	- 60		V	$I_G = -1 \mu\text{A}$, $V_{DS} = 0\text{V}$	
Gate to Gate Breakdown Voltage	BV_{G1G2}	± 40			V	$I_G = -1 \mu\text{A}$, $I_D = 0\text{A}$, $I_S = 0\text{A}$	
Gate Reverse Current	I_{GSS}			- 3	pA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$	
				- 3	nA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$	
Gate Operating Current	I_G			- 0.5	pA	$V_{DS} = 10\text{V}$, $I_D = 30 \mu\text{A}$	
				- 500	pA	$V_{DS} = 10\text{V}$, $I_D = 30 \mu\text{A}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	- 0.4		- 3	V	$V_{DS} = 10\text{V}$, $I_D = 1 \text{nA}$	
Gate Source Voltage	V_{GS}			- 2.9	V	$V_{DS} = 10\text{V}$, $I_D = 30 \mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	60	1800		μA	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	100		1500	μS	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$		$f = 1 \text{ kHz}$
Common Source Output Conductance	g_{os}			3	μS	$V_{DS} = 10\text{V}$, $I_D = 30 \mu\text{A}$		$f = 1 \text{ kHz}$
Common Source Input Capacitance	C_{iss}			3	pF	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$		$f = 1 \text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}			1.5	pF	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$		$f = 1 \text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20	70	nV/√Hz	$V_{DS} = 10\text{V}$, $I_D = 30 \mu\text{A}$		$f = 10 \text{ Hz}$
Noise Figure	NF			1	dB	$V_{DS} = 10\text{V}$, $I_D = 30 \mu\text{A}$ $R_G = 1 \text{ M}\Omega$		$f = 10 \text{ Hz}$

Max - IFN424 IFN425 IFN426

Differential Gate Source Voltage	$ V_{GS1}-V_{GS2} $	10	15	25	mV	$V_{DG} = 10\text{V}, I_D = 30\text{ }\mu\text{A}$	
Differential Gate Source Voltage With Temperature	$\frac{ V_{GS1}-V_{GS2} }{\Delta T}$	10	25	40	$\mu\text{V}/^{\circ}\text{C}$	$V_{DG} = 10\text{V}, I_D = 30\text{ }\mu\text{A}$	$T_A = -55^{\circ}\text{C}$ $T_B = 25^{\circ}\text{C}$ $T_C = 125^{\circ}\text{C}$

Min - IFN424 IFN425 IFN426

Common Mode Rejection Ratio	CMRR	90	80	80	dB	$V_{DG} = 10\text{V to } 20\text{V}$, $I_D = 30 \mu\text{A}$	
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TO-78 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Drain 1, 3 Gate 1, 4 Case,
5 Source 2, 6 Drain 2, 7 Gate 2,
8 Omitted

IFN860

Dual N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise Audio Amplifier
- Equivalent to Crystallonics CD860

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	400 mW
Power Derating	2.3 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IFN860			Process NJ450L		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20			V	$I_G = -1\text{ }\mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Leakage Voltage	I_{GSS}			3	nA	$V_{GS} = -10\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3		– 3	V	$V_{DS} = 10\text{V}$, $I_D = 100\text{ }\mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	10			mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	
Differential Gate Source Voltage	$ V_{GS1} - V_{GS2} $			25	mV	$V_{DS} = 10\text{V}$, $I_D = 100\text{ }\mu\text{A}$	

Dynamic Electrical Characteristics

Transconductance	g_m	25	40		mS	$V_{DS} = 10\text{V}$, $I_D = -10\text{ mA}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		30	35	pF	$V_{DS} = 10\text{V}$, $I_D = -10\text{ mA}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		17	20	pF	$V_{DS} = 10\text{V}$, $I_D = -10\text{ mA}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$			2	nV/√Hz	$V_{DG} = 3\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$

TO-71 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 5 Source,
6 Drain, 7 Gate

IFN5114, IFN5115, IFN5116

P-Channel Silicon Junction Field-Effect Transistor

• Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 50 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	500 mW
Power Derating	4 mW/°C
Storage Temperature Range	– 65°C to 200°C

At 25°C free air temperature:
Static Electrical Characteristics

		IFN5114		IFN5115		IFN5116		Process PJ99	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		30		V	$I_G = -1\text{ mA}$, $V_{DS} = \emptyset\text{ V}$
Gate Reverse Current	I_{GSS}		2		2		2	nA	$V_{GS} = 20\text{ V}$, $V_{DS} = \emptyset\text{ V}$
			10		10		10	μA	$V_{GS} = 20\text{ V}$, $V_{DS} = \emptyset\text{ V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	5	10	3	6	1	4	V	$V_{DS} = -15\text{ V}$, $I_G = -1\text{ nA}$
Gate Source Forward Voltage	$V_{GS(F)}$		– 1		– 1		– 1	V	$V_{DS} = \emptyset\text{ V}$, $I_G = -1\text{ mA}$
Drain Saturation Current (Pulsed)	I_{DSS}	– 30	– 90					mA	$V_{DS} = -15\text{ V}$, $V_{GS} = 18\text{ V}$
				– 15	– 60	– 5	– 25	mA	$V_{DS} = -15\text{ V}$, $V_{GS} = 15\text{ V}$
Drain Cutoff Current	$I_{D(OFF)}$		– 2		– 2		– 2	nA	$V_{DS} = -15\text{ V}$, $V_{GS} = 12\text{ V}$
			– 10		– 10		– 10	μA	$V_{DS} = -15\text{ V}$, $V_{GS} = 7\text{ V}$, $T_A = 150^\circ\text{C}$
Drain Source ON Voltage	$V_{DS(ON)}$		– 1.3					V	$V_{GS} = \emptyset\text{ V}$, $I_D = -15\text{ mA}$
					– 0.8			V	$V_{GS} = \emptyset\text{ V}$, $I_D = -7\text{ mA}$
						– 0.6		V	$V_{GS} = \emptyset\text{ V}$, $I_D = -3\text{ mA}$
Static Drain Source ON Resistance	$r_{DS(ON)}$		75		100		150	Ω	$V_{GS} = \emptyset\text{ V}$, $I_D = -1\text{ mA}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		75		100		150	Ω	$V_{GS} = \emptyset\text{ V}$, $I_D = \emptyset\text{ A}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		25		25		27	pF	$V_{DS} = -15\text{ V}$, $V_{GS} = \emptyset\text{ V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		7					pF	$V_{DS} = -10\text{ V}$, $V_{GS} = 12\text{ V}$	$f = 1\text{ MHz}$
					7			pF	$V_{DS} = -10\text{ V}$, $V_{GS} = 7\text{ V}$	$f = 1\text{ MHz}$
							7	pF	$V_{DS} = -10\text{ V}$, $V_{GS} = 5\text{ V}$	$f = 1\text{ MHz}$

Switching Characteristics

		IFN5114		IFN5115		IFN5116			
Turn ON Delay Time	$t_{d(on)}$		6		10		25	ns	$V_{DD} = -10$, $V_{GG} = 20$, $R_L = 130$, $R_G = 100$, $I_{D(ON)} = -15$
Rise Time	t_r		10		20		35	ns	$V_{GG} = 20$, $R_L = 130$, $R_G = 100$, $I_{D(ON)} = -15$
Turn OFF Delay Time	$t_{d(off)}$		6		8		20	ns	$V_{GG} = 20$, $R_L = 130$, $R_G = 100$, $I_{D(ON)} = -15$
Fall Time	t_f		15		30		60	ns	$V_{GG} = 20$, $R_L = 130$, $R_G = 100$, $I_{D(ON)} = -15$

TO-18 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Gate & Case, 3 Drain

Surface Mount

SMP5114, SMP5115, SMP5116

IFN5432, IFN5433, IFN5434

N-Channel Silicon Junction Field-Effect Transistor

- Analog Low On Resistance Switches
- Choppers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 25 V

Continuous Forward Gate Current

100 mA

Continuous Device Power Dissipation

300 mW

Power Derating

2.4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		IFN5432		IFN5433		IFN5434		Process NJ903		
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		– 25		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 200		– 200		– 200	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
			– 200		– 200		– 200	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 3	– 9	– 1	– 4	V	$V_{DS} = 5\text{V}$, $I_G = 3\text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	150		100		30		mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		200		200		200	pA	$V_{DS} = 5\text{V}$, $V_{GS} = -10\text{V}$	
			200		200		200	nA	$V_{DS} = 5\text{V}$, $V_{GS} = -10\text{V}$	$T_A = 150^\circ\text{C}$
Drain Source ON Voltage	V_{DS}		50		70		100	mV	$V_{GS} = \emptyset\text{V}$, $I_D = 10\text{mA}$	
Static Drain Source ON Resistance	$r_{DS(ON)}$	2	5		7		10	Ω	$V_{DS} = \emptyset\text{V}$, $I_D = 10\text{mA}$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		5		7		10	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \emptyset\text{A}$	$f = 1\text{kHz}$
Common Source Input Capacitance	C_{iss}		60		60		60	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		20		20		20	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{MHz}$

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$		4		4		4	ns	$V_{DD} = 1.5\text{V}$, $V_{GS(ON)} = \emptyset\text{V}$ $V_{GS(OFF)} = -12\text{V}$, $I_{D(ON)} = 10\text{mA}$ (IFN5432) $R_L = 145\ \Omega$ (IFN5433) $R_L = 143\ \Omega$ (IFN5434) $R_L = 140\ \Omega$
Rise Time	t_r		1		1		1	ns	
Turn OFF Delay Time	$t_{d(off)}$		6		6		6	ns	
Fall Time	t_f		30		30		30	ns	

TO-52 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case



IFN5564, IFN5565, IFN5566

N-Channel Dual Silicon Junction Field-Effect Transistor

- Wide Band Differential Amplifier
- Commutators

Absolute maximum ratings at $T_A = 25^\circ\text{C}$.

Reverse Gate Source & Reverse Gate Drain Voltage	– 40 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	650 mW
Power Derating	3.3 mW/°C

At 25°C free air temperature: Static Electrical Characteristics

		IFN5564		IFN5565		IFN5566		Process NJ72	
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40		– 40		– 40		V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Leakage Voltage	I_{GSS}		– 100		– 100		– 100	pA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$
			– 200		– 200		– 200	nA	$T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5	– 3	– 0.5	– 3	– 0.5	– 3	V	$V_{DS} = 15\text{V}$, $I_D = 1\text{nA}$
Gate Source Voltage	$V_{GS(f)}$		1		1		1	V	$V_{DS} = \emptyset\text{V}$, $I_G = 2\text{mA}$
Saturation Current (Pulsed)	I_{DSS}	5	30	5	30	5	30	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$
Static Drain Source ON Resistance	$r_{DS(ON)}$		100		100		100	Ω	$I_D = 1\text{mA}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	7000	12500	7000	12500	7000	12500	μhmo	$V_{DG} = 15\text{V}$, $I_D = 2\text{mA}$	$f = 1\text{kHz}$
		7000		7000		7000		μhmo		$f = 100\text{MHz}$
Common Source Output Transconductance	g_{os}		45		45		45	μhmo	$V_{DS} = 15\text{V}$, $I_D = 2\text{mA}$	$f = 1\text{kHz}$
Common Source Input Capacitance	C_{iss}		12		12		12	pF	$V_{DS} = 15\text{V}$, $I_D = 2\text{mA}$	$f = 1\text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		3		3		3	pF	$V_{DS} = 15\text{V}$, $I_D = 2\text{mA}$	$f = 1\text{MHz}$
Noise Figure	NF		1		1		1	dB	$V_{DS} = 15\text{V}$, $I_D = 2\text{mA}$ $R_G = 1\text{M}\Omega$	$f = 10\text{Hz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		50		50		50	nV/ $\sqrt{\text{Hz}}$	$V_{DG} = 15\text{V}$, $I_D = 2\text{mA}$	$f = 10\text{Hz}$

Characteristics

Saturation Drain Current Ratio (Pulsed)	$\frac{I_{DSS1}}{I_{DSS2}}$	0.95	1	0.95	1	0.95	1	–	$V_{DG} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	
Differential Gate Source Voltage	$ V_{GS(1)} - V_{GS(2)} $		5		10		20	mV	$V_{DS} = 15\text{V}$, $I_D = 2\text{mA}$	
Gate Source Voltage Differential Drift	$\frac{\Delta V_{GS(f)} - V_{GS(f)} }{\Delta T}$		10		25		50	$\mu\text{V}/^\circ\text{C}$	$V_{DS} = 15\text{V}$, $T_A = 25^\circ\text{C}$, $T_B = 125^\circ\text{C}$	
			10		25		50	$\mu\text{V}/^\circ\text{C}$	$I_D = 2\text{mA}$, $T_A = 55^\circ\text{C}$, $T_B = 25^\circ\text{C}$	
Transconductance Ratio (Pulsed)	$\frac{g_{fs(1)}}{g_{fs(2)}}$	0.95	1	0.9	1	0.9	1	–	$V_{DS} = 15\text{V}$, $I_D = 2\text{mA}$	

TO-71 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Omitted,
5 Source, 6 Drain, 7 Gate, 8 Omitted

IFN5911, IFN5912

N-Channel Dual Silicon Junction Field-Effect Transistor

- VHF Amplifiers
- Wideband Differential Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	500 mW
Power Derating	4 mW/ $^\circ\text{C}$
Storage Temperature Range	-65°C to 200°C

At 25°C free air temperature:

Static Electrical Characteristics

		IFN5911		IFN5912		Process NJ30L or NJ36D		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	-25		-25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		-100		-100	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
			-250		-250	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 150^\circ\text{C}$
Gate Operating Current	I_G		-100		-100	pA	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	
			-100		-100	nA	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$T_A = 125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	-1	-5	-1	-5	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$	
Gate Source Voltage	V_{GS}	-0.3	-4	-0.3	-4	V	$V_{DS} = 10\text{V}$, $I_D = 5\text{ mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	7	40	7	40	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	3000	10000	3000	10000	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$
		3000	10000	3000	10000	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 100\text{ MHz}$
Common Source Output Conductance	g_{os}		100		100	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$
			150		150	μS	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 100\text{ MHz}$
Common Source Input Capacitance	C_{iss}		5		5	pF	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20	nV/ $\sqrt{\text{Hz}}$	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 10\text{ kHz}$
Noise Figure	NF		1		1	dB	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$ $R_G = 100\text{ K}\Omega$	$f = 10\text{ Hz}$
Differential Gate Current	$ I_{G1} - I_{G2} $		20		20	nA	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$T_A = 125^\circ\text{C}$
Saturation Drain Current Ratio	I_{DSS1}/I_{DSS2}	0.95	1	0.95	1		$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	
Differential Gate Source Voltage	$V_{GS1} - V_{GS2}$		10		15	mV	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	
Gate Source Voltage Differential Drift	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		20		40	$\mu\text{V}/^\circ\text{C}$	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$T_A = 25^\circ\text{C}$ $T_B = 125^\circ\text{C}$
	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		20		40	$\mu\text{V}/^\circ\text{C}$	$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$T_A = -55^\circ\text{C}$ $T_B = 25^\circ\text{C}$
Transconductance Ratio	g_{fs1}/g_{fs2}	0.95	1	0.95	1		$V_{DG} = 10\text{V}$, $I_D = 5\text{ mA}$	$f = 1\text{ kHz}$

TO-78 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case,
5 Source, 6 Drain, 7 Gate, 8 Omitted

InterFET Corporation

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(972) 487-1287 FAX (972) 276-3375

IFN6449, IFN6450

N-Channel Silicon Junction Field-Effect Transistor

• High Voltage

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

	IFN6449	IFN6450
Reverse Gate Source Voltage	– 100 V	– 100 V
Reverse Gate Drain Voltage	– 300 V	– 200 V
Continuous Forward Gate Current	10 mA	10 mA
Continuous Device Power Dissipation	800 mW	800 mW
Power Derating	6.4 mW/°C	6.4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		IFN6449		IFN6450		Process NJ42	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Drain Breakdown Voltage	$V_{(BR)GDO}$	– 300		– 200		V	$I_G = -10\ \mu\text{A}$, $I_S = \emptyset\text{A}$
Gate Source Breakdown Voltage	$V_{(BR)GSO}$	– 100		– 100		V	$I_G = -10\ \mu\text{A}$, $I_D = \emptyset\text{A}$
Gate Reverse Current	I_{GSS}				– 100	nA	$V_{GS} = -80\text{V}$, $V_{DS} = \emptyset\text{V}$
					– 100	μA	$V_{GS} = -80\text{V}$, $V_{DS} = \emptyset\text{V}$ $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2	– 15	– 2	– 15	V	$V_{DS} = 30\text{V}$, $I_D = 4\ \text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	2	10	2	10	mA	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transfer Transmittance	$ Y_{fs} $	0.5	3	0.5	3	mS	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Output Conductance	g_{os}		100		100	μS	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{kHz}$
Common Source Input Capacitance	C_{iss}		10		10	pF	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		5		5	pF	$V_{DS} = 30\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\ \text{MHz}$

TO-39 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case



InterFET Corporation

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J108, J109

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 25 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

360 mW

Power Derating

3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		J108		J109		Process NJ450		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 3		– 3	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 3	– 10	– 2	– 6	V	$V_{DS} = 5\text{V}$, $I_D = 1\ \mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	80		40		mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		3		3	nA	$V_{DS} = 5\text{V}$, $V_{GS} = -10\text{V}$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		8		12	Ω	$V_{GS} = \emptyset$, $V_{DS} \leq 0.1\text{V}$	$f = 1\text{ kHz}$
Drain Gate Capacitance	C_{gd}		15		15	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Source Gate Capacitance	C_{gs}		15		15	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Drain Gate + Source Gate Capacitance	$C_{gd} + C_{gs}$		85		85	pF	$V_{DS} = V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

		Typ		Typ				
Turn ON Delay Time	$t_{d(on)}$	3	3	ns		J108 J109		
Rise Time	t_r	1	1	ns			V_{DD}	1.5
Turn OFF Delay Time	$t_{d(off)}$	4	4	ns			$V_{GS(OFF)}$	– 12
Fall Time	t_f	18	18	ns			R_L	150
								V
								V
								Ω

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ108, SMPJ109



J110, J110A

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 25 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		J110		J110A		Process NJ450	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}		– 3		– 3	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5	– 4	– 0.5	– 4	V	$V_{DS} = 5\text{V}$, $I_D = 1\ \mu\text{A}$
Drain Saturation Current (Pulsed)	I_{DSS}	10		10		mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$
Drain Cutoff Current	$I_{D(OFF)}$		3		3	nA	$V_{DS} = 5\text{V}$, $V_{GS} = -10\text{V}$

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		18		25	Ω	$V_{GS} = 0$, $V_{DS} \leq 0.1\text{V}$	$f = 1\text{ kHz}$
Drain Gate Capacitance	C_{gd}		15		15	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Source Gate Capacitance	C_{gs}		15		15	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Drain Gate + Source Gate Capacitance	$C_{gd} + C_{gs}$		85		85	pF	$V_{DS} = V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

		Typ		Typ				
Turn ON Delay Time	$t_{d(on)}$	4	4	ns		J110 J110A		
Rise Time	t_r	1	1	ns			V_{DD}	1.5
Turn OFF Delay Time	$t_{d(off)}$	6	6	ns			$V_{GS(OFF)}$	– 5
Fall Time	t_f	30	30	ns			R_L	150

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ110, SMPJ110A



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J111, J112, J113

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 35 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

360 mW

Power Derating

3.27 mW/°C

At 25°C free air temperature
Static Electrical Characteristics

		J111		J112		J113		Process NJ132		
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 35		– 35		– 35		V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$	
Gate Reverse Current	I_{GSS}		– 1		– 1		– 1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 3	– 10	– 1	– 5		– 3	V	$V_{DS} = 5\text{V}$, $I_D = 1\mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	20		5		2		mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		– 1		– 1		– 1	nA	$V_{DS} = 15\text{V}$, $V_{GS} = -10\text{V}$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		30		50		100	Ω	$V_{GS} = 0\text{V}$, $V_{DS} = 0.1\text{V}$	$f = 1\text{ kHz}$
Drain Gate Capacitance	C_{dg}		5		5		5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Source Gate Capacitance	C_{gs}		5		5		5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Drain Gate + Source Gate Capacitance	$C_{gd} + C_{gs}$		28		28		28	pF	$V_{DS} = V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

		Typ		Typ		Typ					
Turn ON Delay Time	$t_{d(on)}$	7		7		7	ns		J111	J112	J113
Rise Time	t_r	6		6		2	ns	V_{DD}	10	10	10
Turn OFF Delay Time	$t_{d(off)}$	20		20		20	ns	$V_{GS(OFF)}$	– 12	– 7	– 5
Fall Time	t_f	15		15		15	ns	R_L	800	1600	3200
											Ω

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ111, SMPJ112, SMPJ113



J174, J175

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 30 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		J174		J175		Process PJ99		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		V	$I_G = 1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		1		1	nA	$V_{GS} = 20\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	5	10	3	6	V	$V_{DS} = -15\text{V}$, $I_D = -10\text{ nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	– 20	– 125	– 7	– 70	mA	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		– 1		– 1	nA	$V_{DS} = -15\text{V}$, $V_{GS} = 10\text{V}$	

Dynamic Electrical Characteristics

		Max		Max				
Drain Source ON Resistance	$r_{ds(on)}$	85		85		Ω	$V_{GS} = \emptyset$, $V_{DS} \leq 0.1\text{V}$	$f = 1\text{ kHz}$

Dynamic Electrical Characteristics

		Typ		Typ				
Drain Gate Capacitance	C_{gd}	5.5		5.5		pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = 10\text{V}$	$f = 1\text{ MHz}$
Source Gate Capacitance	C_{gs}	5.5		5.5		pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = 10\text{V}$	$f = 1\text{ MHz}$
Drain Gate + Source Gate Capacitance	$C_{gd} + C_{gs}$	32		32		pF	$V_{DS} = V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$	2	5	ns	V_{DD} $V_{GS(OFF)}$ R_L $V_{GS(ON)}$	J174 – 10 12 560 $\emptyset$	J175 – 6 8 1.2k $\emptyset$	V V Ω V
Rise Time	t_r	5	10	ns				
Turn OFF Delay Time	$t_{d(off)}$	5	10	ns				
Fall Time	t_f	10	20	ns				

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Gate, 3 Source

Surface Mount

SMPJ174, SMPJ175



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J176, J177

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 30 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

360 mW

Power Derating

3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		J176		J177		Process PJ99		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		V	$I_G = 1\ \mu\text{A}$, $V_{DS} = 0\text{V}$	
Gate Reverse Current	I_{GSS}		1		1	nA	$V_{GS} = 20\text{V}$, $V_{DS} = 0\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	1	4	0.8	2.25	V	$V_{DS} = -15\text{V}$, $I_D = -10\text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	– 2	– 35	– 1.5	– 20	mA	$V_{DS} = -15\text{V}$, $V_{GS} = 0\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		– 1		– 1	nA	$V_{DS} = -15\text{V}$, $V_{GS} = 10\text{V}$	

Dynamic Electrical Characteristics

Max

Max

Drain Source ON Resistance	$r_{ds(on)}$	250	300	Ω	$V_{GS} = 0$, $V_{DS} \leq 0.1\text{V}$	$f = 1\text{ kHz}$
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Dynamic Electrical Characteristics

Typ

Typ

Drain Gate Capacitance	C_{gd}	5.5	5.5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = 10\text{V}$	$f = 1\text{ MHz}$
Source Gate Capacitance	C_{gs}	5.5	5.5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = 10\text{V}$	$f = 1\text{ MHz}$
Drain Gate + Source Gate Capacitance	$C_{gd} + C_{gs}$	32	32	pF	$V_{DS} = V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$	15	20	ns	J176 J177	
Rise Time	t_r	20	25	ns		V_{DD} – 6 V
Turn OFF Delay Time	$t_{d(off)}$	15	20	ns		$V_{GS(OFF)}$ 6 V
Fall Time	t_f	20	25	ns		R_L 5.6 k Ω
					$V_{GS(ON)}$ $\emptyset$	$\emptyset$ V

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Gate, 3 Source

Surface Mount

SMPJ176, SMPJ177



InterFET Corporation

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J201, J202

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers
- General Purpose Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 40 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

		J201			J202			Process NJ16	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40			– 40			V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$
Gate Operating Current	I_G		– 10			– 10		pA	$V_{DG} = 20\text{V}$, $I_D = I_{DSS(\text{min})}$
Gate Source Cutoff Voltage	$V_{GS(\text{OFF})}$	– 0.3		– 1.5	– 0.8		– 4	V	$V_{DS} = 20\text{V}$, $I_D = 10\text{ nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	0.2		1	0.9		4.5	mA	$V_{DSS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	500			1000			μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		1			3.5		μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		4			4		pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5			5		nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ201, SMPJ202



InterFET Corporation

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J203, J204

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers
- General Purpose Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 40 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

360 mW

Power Derating

3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		J203			J204			Process NJ16	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40			– 25			V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	$V_{GS} = -20\text{V}$, $V_{DS} = \emptyset\text{V}$
Gate Operating Current	I_G		– 10			– 10		pA	$V_{DG} = 20\text{V}$, $I_D = I_{DSS(\text{min})}$
Gate Source Cutoff Voltage	$V_{GS(\text{OFF})}$	– 2		– 10	– 0.3		– 2	V	$V_{DS} = 20\text{V}$, $I_D = 10\text{ nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	4		20	0.2	1.2	3	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	1500			500	1500		μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		10			2.5		μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		4			4		pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5			10		nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ203, SMPJ204



InterFET Corporation

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J210, J211

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers
- General Purpose Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 25 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

		J210			J211			Process NJ26L	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			– 25			V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$
Gate Operating Current	I_G		– 10			– 10		pA	$V_{DS} = 20\text{V}$, $I_D = 1\text{mA}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 3	– 2.5		– 4.5	V	$V_{DS} = 15\text{V}$, $I_D = 1\text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	2		15	7		20	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	4000		12000	6000		12000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{kHz}$
Common Source Output Conductance	g_{os}			150			200	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{kHz}$
Common Source Input Capacitance	C_{iss}		4			4		pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{kHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ210, SMPJ211



InterFET Corporation

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N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifier
- General Purpose Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 25 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		J212			Process NJ26L		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}			– 100	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Operating Current	I_G		– 10		pA	$V_{DS} = 20\text{V}$, $I_D = 1\text{mA}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4		– 6	V	$V_{DS} = 15\text{V}$, $I_D = 1\text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	15		40	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	7000		12000	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{kHz}$
Common Source Output Conductance	g_{os}			200	μS	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{kHz}$
Common Source Input Capacitance	C_{iss}		4		pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1		pF	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10		nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{kHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ212



J230, J231

N-Channel Silicon Junction Field-Effect Transistor

• Audio Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 40 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

		J230			J231			Process NJ16	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40			– 40			V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}			– 250			– 250	pA	$V_{GS} = -30\text{V}$, $V_{DS} = \emptyset\text{V}$
Gate Operating Current	I_G		– 2			– 2		pA	$V_{DS} = 20\text{V}$, $I_D = \emptyset\text{V}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5		– 3	– 1.5		– 5	V	$V_{DS} = 20\text{V}$, $I_D = 1\mu\text{A}$
Drain Saturation Current (Pulsed)	I_{DSS}	0.7		3	2		6	mA	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	1000		3500	1500		4000	μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		1.5			3		μS	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		4			4		pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	$V_{DS} = 20\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		8	30		8	30	nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 10\text{ Hz}$
			2			2		nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ230, SMPJ231



1000 N. Shiloh Road, Garland, TX 75042
(972) 487-1287 FAX (972) 276-3375

www.interfet.com

N-Channel Silicon Junction Field-Effect Transistor

• Audio Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 40 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

360 mW

Power Derating

3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		J232			Process NJ16		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40			V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$	
Gate Reverse Current	I_{GSS}			– 250	pA	$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$	
Gate Operating Current	I_G		– 2		pA	$V_{DS} = 20\text{V}$, $I_D = 0\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 3		– 6	V	$V_{DS} = 20\text{V}$, $I_D = 1\ \mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	5		10	mA	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	2500		5000	μS	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}		5		μS	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		4		pF	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		1		pF	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20	30	nV/√Hz	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	$f = 10\text{ Hz}$
			6		nV/√Hz	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ232



J304, J305

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- Oscillators
- VHF/UHF Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage	– 30 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

		J304			J305			Process NJ26	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30			– 30			V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2		– 6	– 0.5		– 3	V	$V_{DS} = 15\text{V}$, $I_D = 1\text{nA}$
Drain Saturation Current (Pulsed)	I_{DSS}	5		15	1		8	mA	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	4500		7500	3000			μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
						3000		μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			4200					μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Output Conductance	g_{os}			50			50	μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		3			3		pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		0.85			0.85		pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Output Capacitance	C_{oss}		1			1		pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 1\text{ MHz}$
Common Source Output Conductance	g_{os}		60			60		μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			80					μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Output Susceptance	b_{os}		800			800		μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			3600					μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Input Conductance	g_{is}		80			80		μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			800					μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Input Susceptance	b_{is}		2000			2000		μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 100\text{ MHz}$
			7500					μS	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$	$f = 400\text{ MHz}$
Common Source Power Gain	G_{ps}		20					dB	$V_{DS} = 15\text{V}$, $I_D = 5\text{ mA}$	$f = 100\text{ MHz}$
			11					dB	$V_{DS} = 15\text{V}$, $I_D = 5\text{ mA}$	$f = 400\text{ MHz}$
Noise Figure	NF		1.7					dB	$V_{DS} = 15\text{V}$, $I_D = 5\text{ mA}$	$f = 100\text{ MHz}$
			3.8					dB	$R_G = 1\ \Omega$	$f = 400\text{ MHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ304, SMPJ305



InterFET Corporation

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(972) 487-1287 FAX (972) 276-3375

www.interfet.com

J308, J309

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- Oscillators
- VHF/UHF Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 25 V

Continuous Forward Gate Current

10 mA

Continuous Device Power Dissipation

360 mW

Power Derating

3.27 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

		J308			J309			Process NJ72	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			– 25			V	$I_G = -1\mu\text{A}$, $V_{DS} = 0\text{V}$
Gate Reverse Current	I_{GSS}			– 1			– 1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$
				– 1			– 1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$, $T_A = +125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 6.5	– 1		– 4	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{nA}$
Gate Source Forward Voltage	$V_{GS(F)}$			1			1	V	$V_{DS} = 0\text{V}$, $I_G = 1\text{mA}$
Drain Saturation Current (Pulsed)	I_{DSS}	12		60	12		30	mA	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	8000	17000		10000	17000		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 1\text{kHz}$
Common Source Output Conductance	g_{os}			250			250	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 1\text{kHz}$
Common Gate Forward Transconductance	g_{fg}		13000			13000		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 1\text{kHz}$
Common Gate Output Transconductance	g_{og}		150			100		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 1\text{kHz}$
Gate Drain Capacitance	C_{dg}		1.8	2.5		1.8	2.5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{MHz}$
Gate Source Capacitance	C_{gs}		4	5		4	5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/√Hz	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 100\text{kHz}$
Common Source Forward Transconductance	$Re_{(Yfs)}$		12			12		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 105\text{MHz}$
Common Gate Input Conductance	$Re_{(Yig)}$		14			14		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 105\text{MHz}$
Common Source Input Conductance	$Re_{(Yis)}$		0.4			0.4		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 105\text{MHz}$
Common Source Output Conductance	$Re_{(Gos)}$		0.15			0.15		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 105\text{MHz}$
Common Gate Power Gain at Noise Match	G_{pg}		16			16		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 105\text{MHz}$
			11			11		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$f = 450\text{MHz}$
Noise Figure	NF		1.5			1.5		dB	$V_{DS} = 15\text{V}$, $I_D = 10\text{mA}$	$f = 105\text{MHz}$
			2.7			2.7		dB	$V_{DS} = 15\text{V}$, $I_D = 10\text{mA}$	$f = 450\text{MHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ308, SMPJ309



InterFET Corporation

1000 N. Shiloh Road, Garland, TX 75042

(972) 487-1287 FAX (972) 276-3375

J310

N-Channel Silicon Junction Field-Effect Transistor

- Mixer
- Oscillator
- VHF/UHF Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source Voltage	– 25 V
Reverse Gate Drain Voltage	– 25 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	360 mW

At 25°C free air temperature:

Static Electrical Characteristics

		J310			Process NJ72		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	$I_G = -1\ \mu\text{A}$, $V_{DS} = 0\text{V}$	
Gate Reverse Current	I_{GSS}			– 1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$	
				– 1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = 0\text{V}$	$T_A = +125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2		– 6.5	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	$V_{DS} = 0\text{V}$, $I_G = 1\text{ mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	24		60	mA	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$	

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	8000	17000		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}			250	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Common Gate Forward Transconductance	g_{fg}		1200		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Common Gate Output Transconductance	g_{og}		150		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Gate Drain Capacitance	C_{dg}		1.8	2.5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Gate Source Capacitance	C_{gs}		4	5	pF	$V_{DS} = 0\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10		nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 100\text{ Hz}$
Common Source Forward Transconductance	$\text{Re}(Y_{fs})$		12		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
Common Gate Input Conductance	$\text{Re}(Y_{ig})$		14		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
Common Source Input Conductance	$\text{Re}(Y_{is})$		0.4		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
Common Source Output Conductance	$\text{Re}(g_{os})$		0.15		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
Common Gate Power Gain at Noise Match	G_{pg}		16		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
			11		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 450\text{ MHz}$
Noise Figure	NF		1.5		dB	$V_{DS} = 15\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
			2.7		dB	$V_{DS} = 15\text{V}$, $I_D = 10\text{ mA}$	$f = 450\text{ MHz}$

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ310



1000 N. Shiloh Road, Garland, TX 75042
(972) 487-1287 FAX (972) 276-3375

www.interfet.com

P1086, P1087

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Analog Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

30 V

Continuous Forward Gate Current

50 mA

Continuous Device Power Dissipation

360 mW

Power Derating

3.27 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		P1086		P1087		Process PJ99		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		V	$I_G = 1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		2		2	nA	$V_{GS} = 15\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		10		5	V	$V_{DS} = -15\text{V}$, $I_D = -1\ \mu\text{A}$	
Saturation Drain Current (Pulsed)	I_{DSS}	-10		-5.0		mA	$V_{DS} = -20\text{V}$, $V_{GS} = \emptyset\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		-10		-10	nA	$V_{DS} = -15\text{V}$, $V_{GS} = 12\text{V}$ (P1086)	$T_A = 85^\circ\text{C}$
			-0.5		-0.5	μA	$V_{GS} = 7\text{V}$ (P1087)	
Drain Reverse Current	I_{DGO}		2		2	nA	$V_{DG} = -15\text{V}$, $I_S = \emptyset\text{A}$	$T_A = 85^\circ\text{C}$
			0.1		0.1	μA	$V_{DG} = -15\text{V}$, $I_S = \emptyset\text{A}$	
Drain Source ON Voltage	$V_{DS(ON)}$		-0.5		-0.5	V	$V_{GS} = \emptyset\text{V}$, $I_D = -6\text{mA}$ (P1086)	
			-0.5		-0.5	V	$V_{GS} = \emptyset\text{V}$, $I_D = -3\text{mA}$ (P1087)	
Static Drain Source ON Resistance	$r_{DS(ON)}$		75		150	Ω	$I_D = -1\text{mA}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		75		150	Ω	$I_D = \emptyset$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Input Capacitance	C_{iss}		45		45	pF	$V_{DS} = -15\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ kHz}$
Common Source Reverse Transfer Capacitance	C_{rss}		10		10	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = 12\text{V}$ (P1086)	$f = 1\text{ MHz}$
			10		10	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = 7\text{V}$ (P1087)	

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$		15		15	ns	$V_{DD} = -6\text{V}$, $V_{GS(ON)} = \emptyset\text{V}$ P1086 P1087	
Rise Time	t_r		20		75	ns		$V_{GS(OFF)}$ 12 7 V
Turn OFF Delay Time	$t_{d(off)}$		15		25	ns		$V_{D(ON)}$ -6 -3 MA
Fall Time	t_f		50		100	ns		R_L 910 1.8K Ω

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate

Surface Mount

SMPP1086, SMPP1087



InterFET Corporation

1000 N. Shiloh Road, Garland, TX 75042

(972) 487-1287 FAX (972) 276-3375

SMP5911, SMP5912

Dual N-Channel Silicon Junction Field-Effect Transistor

- Wideband Differential Amplifiers

At 25°C free air temperature:

Static Electrical Characteristics

		SMP5911		SMP5912		Process NJ30L	
		Min	Max	Min	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	- 25		- 25		V	$I_G = -1 \mu A, V_{DS} = \emptyset V$
Gate Reverse Current	I_{GSS}		- 100		- 100	pA	$V_{GS} = -15 V, V_{DS} = \emptyset V$
			- 250		- 250	nA	$V_{GS} = -15 V, V_{DS} = \emptyset V$ $T_A = 150^\circ C$
Gate Operating Current	I_G		- 100		- 100	pA	$V_{DG} = 10 V, I_D = 5 mA$
			- 100		- 100	nA	$V_{DG} = 10 V, I_D = 5 mA$ $T_A = 125^\circ C$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	- 1.0	- 5	- 1.0	- 5	V	$V_{DS} = 15 V, I_D = 5 nA$
Gate Source Voltage	V_{GS}	- 0.3	- 4	- 0.3	- 4	V	$V_{DS} = 15 V, I_D = 5 mA$
Drain Saturation Current (Pulsed)	I_{DSS}	7	40	7	40	mA	$V_{DS} = 10 V, V_{GS} = \emptyset V$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	g_{fs}	3000	10000	3000	10000	μS	$V_{DG} = 10 V, I_D = 5 mA$	$f = 1 kHz$
		3000	10000	3000	10000	μS	$V_{DG} = 10 V, I_D = 5 mA$	$f = 100 MHz$
Common Source Output Conductance	g_{os}		100		100	μS	$V_{DG} = 10 V, I_D = 5 mA$	$f = 1 kHz$
			150		150	μS	$V_{DG} = 10 V, I_D = 5 mA$	$f = 100 MHz$
Common Source Input Capacitance	C_{iss}		5		5	pF	$V_{DG} = 10 V, I_D = 5 mA$	$f = 1 MHz$
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	$V_{DG} = 10 V, I_D = 5 mA$	$f = 1 MHz$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20	nV/ $\sqrt{Hz}$	$V_{DG} = 10 V, I_D = 5 mA$	$f = 10 kHz$
Noise Figure	NF		1		1	dB	$V_{DG} = 10 V, I_D = 5 mA$ $R_G = 100 K\Omega$	$f = 10 kHz$
Gate Source Differential Voltage	$V_{GS1} - V_{GS2}$		10		15	mV	$V_{DG} = 10 V, I_D = 5 mA$	
Gate Differential Current	$I_{G1} - I_{G2}$		20		20	nA	$V_{DG} = 10 V, I_D = 5 mA$	$T_A = 125^\circ C$
Drain Saturation Current Ratio	I_{DSS1} / I_{DSS2}	0.95	1	0.95	1		$V_{DG} = 10 V, V_{GS} = \emptyset V$	
Transconductance Ratio	g_{fs1} / g_{fs2}	0.95	1	0.95	1		$V_{DG} = 10 V, I_D = 5 mA$	$f = 1 kHz$
Gate Source Differential Voltage With Temperature	$\Delta V_{GS1} - V_{GS2} / \Delta T$		20		40	$\mu V/^\circ C$	$V_{DG} = 10 V, I_D = 5 mA$	$T_A = 25^\circ C$
			20		40	$\mu V/^\circ C$	$V_{DG} = 10 V, I_D = 5 mA$	$T_B = 125^\circ C$
			20		40	$\mu V/^\circ C$	$V_{DG} = 10 V, I_D = 5 mA$	$T_A = 35^\circ C$
			20		40	$\mu V/^\circ C$	$V_{DG} = 10 V, I_D = 5 mA$	$T_B = 25^\circ C$

SOIC-8 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Drain 1, 3 Gate 1, 4 N/C,
5 Source 2, 6 Drain 2, 7 Gate 2,
8 Omitted



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U290, U291

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Low On Resistance Switches

Absolute maximum ratings at $T_A = 25^\circ\text{C}$

Reverse Gate Source & Reverse Gate Drain Voltage

– 30 V

Continuous Forward Gate Current

100 mA

Continuous Device Power Dissipation

500 mW

Power Derating

4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		U290		U291		Process NJ1800D		
		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 30		V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}		– 1		– 1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{A}$	
			– 1		– 1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{A}$	$T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 1.5	– 4.5	V	$V_{DS} = 15\text{V}$, $I_D = 3\text{ nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	500		200		mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		1		1	nA	$V_{DS} = 5\text{V}$, $V_{GS} = -10\text{V}$	
			1		1	μA	$V_{DS} = 5\text{V}$, $V_{GS} = -10\text{V}$	$T_A = 150^\circ\text{C}$
Drain Source ON Voltage	$V_{DS(ON)}$		30		70	mV	$V_{GS} = \emptyset\text{V}$, $I_D = 10\text{ mA}$	
Static Drain Source ON Resistance	$r_{DS(ON)}$	1	3	2	7	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = 10\text{ mA}$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$	1	3	2	7	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \emptyset$	$f = 1\text{ kHz}$
Drain Gate OFF Capacitance	C_{dgo}		30		30	pF	$V_{DG} = 15\text{V}$, $I_S = \emptyset\text{V}$	$f = 1\text{ MHz}$
Source Gate OFF Capacitance	C_{sgo}		30		30	pF	$V_{DG} = 15\text{V}$, $I_S = \emptyset\text{V}$	$f = 1\text{ MHz}$
Source Gate Plus Drain Gate	C_{iss}		160		160	pF	$V_{DG} = \emptyset\text{V}$, $V_{GS} = \emptyset\text{V}$	$f = 1\text{ MHz}$

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$		15		15	ns	$V_{DD} = 1.5\text{V}$, $I_{D(ON)} = 30\text{ mA}$ $R_L = 50\Omega$ $V_{GS(ON)} = \emptyset\text{V}$ (U290) $V_{GS(OFF)} = -12\text{V}$ (U291) $V_{GS(OFF)} = -7\text{V}$
Rise Time	t_r		20		20	ns	
Turn OFF Delay Time	$t_{d(off)}$		15		15	ns	
Fall Time	t_f		20		20	ns	

TO-52 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case



U308, U309

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- Oscillators
- VHF/UHF Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$.

Reverse Gate Source & Reverse Gate Drain Voltage	– 25 V
Continuous Forward Gate Current	20 mA
Continuous Device Power Dissipation	500 mW
Power Derating	4 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

		U308			U309			Process NJ72	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			– 25			V	$V_{GS} = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}			– 150			– 150	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$
				– 150			– 150	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = +125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 6	– 1		– 4	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$
Gate Source Forward Voltage	$V_{GS(F)}$			1			1	V	$V_{DS} = \emptyset\text{V}$, $I_G = 10\text{ mA}$
Drain Saturation Current (Pulsed)	I_{DSS}	12		60	12		30	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Gate Forward Transconductance	G_{fs}	10	17		10	17		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 1 kHz
			15			15		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 105 MHz
			14			14		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 450 MHz
Common Gate Output Conductance	G_{og}			250			250	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 1 kHz
			0.18			0.18		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 105 MHz
			0.32			0.32		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 450 MHz
Drain Gate Capacitance	C_{dg}			2.5			2.5	pF	$V_{DS} = 10\text{V}$, $V_{GS} = -10\text{V}$	f = 1 MHz
Gate Source Capacitance	C_{gs}			5		5		pF	$V_{DS} = 10\text{V}$, $V_{GS} = -10\text{V}$	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/ $\sqrt{\text{Hz}}$	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 100 kHz
Common Gate Power Gain	G_{pg}	14	16		14	16		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 105 MHz
		10	11		10	11		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 450 MHz
Noise Figure	NF		1.5	2		1.5	2	dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 105 MHz
			2.7	3.5		2.7	3.5	dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	f = 450 MHz

TO-52 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMPJ308/J309



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N-Channel Silicon Junction Field-Effect Transistor

- Mixer
- Oscillator
- VHF/UHF Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$.

Reverse Gate Source & Reverse Gate Drain Voltage

– 25 V

Continuous Forward Gate Current

20 mA

Continuous Device Power Dissipation

500 mW

Power Derating

4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		U310			Process NJ72L		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}			– 150	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
				– 150	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2.5		– 6	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	$V_{DS} = \emptyset\text{V}$, $I_G = 10\text{ mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	24		60	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Gate Forward Transconductance		10	17		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
	g_{fg}		15		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
			14		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 450\text{ MHz}$
Common Gate Output Conductance				250	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
	g_{og}		0.18		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
			0.32		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 450\text{ MHz}$
Drain Gate Capacitance	C_{dg}			2.5	pF	$V_{DS} = 10\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Gate Source Capacitance	C_{gs}			5	pF	$V_{DS} = 10\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10		nV/√Hz	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 100\text{ Hz}$
Common Gate Power Gain	G_{pg}	14	16		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
		10	11		dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 450\text{ MHz}$
Noise Figure	NF		1.5	2	dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 105\text{ MHz}$
			2.7	3.5	dB	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 450\text{ MHz}$

TO-52 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMPJ310



U311

N-Channel Silicon Junction Field-Effect Transistor

- Mixer
- Oscillator
- VHF/UHF Amplifier

Absolute maximum ratings at $T_A = 25^\circ\text{C}$.

Reverse Gate Source & Reverse Gate Drain Voltage	- 25 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2.4 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		U311			Process NJ72L		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	- 25			V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}			- 150	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
				- 150	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	- 1		- 6	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	$V_{DS} = \emptyset\text{V}$, $I_G = 1\text{ mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	20		60	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Common Gate Forward Transconductance	g_{fg}	1000	17000		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Common Gate Output Conductance	g_{og}			250	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Gate Drain Capacitance	C_{dg}			2.5	pF	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ MHz}$
Gate Source Capacitance	C_{gs}			5	pF	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ MHz}$

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case



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Hybrid Quad Silicon Junction Field-Effect Transistor Array

- Analog Multiplier
- VHF Double-Balanced Mixer

Absolute maximum ratings at $T_A = 25^\circ\text{C}$.

Reverse Gate Source & Reverse Gate Drain Voltage

– 25 V

Gate Current

25 mA

Continuous Device Power Dissipation

400 mW

Power Derating

3.2 mW/°C

At 25°C free air temperature:

Static Electrical Characteristics

		U350			Four Matched Process NJ72L		
		Min	Typ	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	$I_G = -1\ \mu\text{A}$, $V_{DS} = \emptyset\text{V}$	
Gate Reverse Current	I_{GSS}			– 1	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	
				– 1	μA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$	$T_A = 125^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2		– 6	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	$V_{DS} = \emptyset\text{V}$, $I_G = 1\text{ mA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	24		60	mA	$V_{DS} = 15\text{V}$, $V_{GS} = \emptyset\text{V}$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		50	90	Ω	$V_{GS} = \emptyset\text{V}$, $I_D = \text{mA}$	$f = 1\text{ kHz}$
Common Source Forward Transconductance	g_{fs}	10		18	mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Common Source Output Conductance	g_{os}			150	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Drain Gate Capacitance	C_{dgo}			2.5	pF	$V_{GD} = -10\text{V}$, $I_S = \emptyset\text{V}$	$f = 1\text{ MHz}$
Gate Source Capacitance	C_{sgo}			5	pF	$V_{GS} = -10\text{V}$, $I_D = \emptyset\text{V}$	$f = 1\text{ MHz}$
(Conversion Gain)	G_c		4		dB	$V_{DS} = 20\text{V}$, $V_{GS} = 1/2 V_{GS(OFF)}$ $R_D = 1,700\ \Omega$	$f = 100\text{ MHz}$
Noise Figure	NF		7		dB	$V_{DS} = 20\text{V}$, $V_{GS} = 1/2 V_{GS(OFF)}$ $R_D = 1,700\ \Omega$	$f = 100\text{ MHz}$
Saturation Drain Current Ratio	I_{DSS} / I_{DSS}	0.9		1		$V_{DS} = 15\text{V}$, $V_{DS} = \emptyset\text{V}$	
Gate Source Cutoff Voltage Ratio	$V_{GS(OFF)} / V_{GS(OFF)}$	0.9		1		$V_{DS} = 15\text{V}$, $I_D = 1\text{ nA}$	
Common Source Forward Transconductance	g_{fs} / g_{fs}	0.9		1		$V_{DS} = 15\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
Differential Output Conductance	Y_{os} / Y_{os}	0.9		1		$V_{DS} = 15\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$

TO-78 Package

Dimensions in Inches (mm)

Pin Configuration

1 Gate 1 & 3, 2 Drain 1 & 4,
3 Source 1 & 2, 4 Ground & Case,
5 Source 3 & 4, 6 Drain 2 & 3,
7 Gate 2 & 4, 8 Omitted



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U430, U431

Dual N-Channel Silicon Junction Field-Effect Transistor

- Balanced Mixers
- Differential Amplifiers

Absolute maximum ratings at $T_A = 25^\circ\text{C}$.

Total Device Dissipation (Derate 4 mW/°C to 150°C)

500 mW

Storage Temperature Range

– 65°C to +150°C

Lead Temperature

300°C

At 25°C free air temperature:
Static Electrical Characteristics

		U430			U431			Process NJ72	
		Min	Typ	Max	Min	Typ	Max	Unit	Test Conditions
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			– 25			V	$I_G = -1\mu\text{A}$, $V_{DS} = \emptyset\text{V}$
Gate Reverse Current	I_{GSS}			– 150			– 150	pA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$
				– 150			– 150	nA	$V_{GS} = -15\text{V}$, $V_{DS} = \emptyset\text{V}$, $T_A = 150^\circ\text{C}$
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 4	– 2		– 6	V	$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$
Gate Source Forward Voltage	$V_{GS(F)}$			1			1	V	$V_{DS} = \emptyset\text{V}$, $I_G = 10\text{ mA}$
Drain Saturation Current (Pulsed)	I_{DSS}	12		30	24		60	mA	$V_{DS} = 10\text{V}$, $V_{GS} = \emptyset\text{V}$

Dynamic Electrical Characteristics

Common Source Forward Transconductance	G_{fs}	10	17		10	17		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
			12			12		mS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 100\text{ MHz}$
Common Source Output Conductance	G_{os}			250			250	μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 1\text{ kHz}$
			0.15			0.15		μS	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 100\text{ MHz}$
Drain Gate Capacitance	C_{dg}			5			5	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Source Gate Capacitance	C_{gs}			2.5			2.5	pF	$V_{DS} = \emptyset\text{V}$, $V_{GS} = -10\text{V}$	$f = 1\text{ MHz}$
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/√Hz	$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 100\text{ kHz}$
Power Match Source Admittance	g_{ig}		12			12			$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	$f = 100\text{ MHz}$
Conversion Gain	G_c		3			3		dB	$V_{DS} = 20\text{V}$, $R_L = 2\text{ k}\Omega$, $V_{GS} = 1/2 V_{GS(OFF)}$	$f = 100\text{ MHz}$
Saturation Drain Current Ratio	I_{DSS1}/I_{DSS2}	0.9		1	0.9		1		$V_{DS} = 10\text{V}$, $V_G = \emptyset\text{V}$	
Gate Source Cutoff Voltage Ratio	$\frac{V_{GS(OFF)1}}{V_{GS(OFF)2}}$	0.9		1	0.9		1		$V_{DS} = 10\text{V}$, $I_D = 1\text{ nA}$	
Transconductance Ratio	g_{fs1}/g_{fs2}	0.9		1	0.9		1		$V_{DS} = 10\text{V}$, $I_D = 10\text{ mA}$	

TO-78 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source 1, 2 Gate 1, Drain 1,
4 Case, 5 Drain 2, 6 Gate 2,
7 Source 2, 8 Omitted



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