2N3821, 2N3822

N-Channel Silicon Junction Field-Effect Transistor

- VHF Amplifiers
- Small Signal Amplifiers

Absolute maximum ratings at T_A = 25°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:		2N3821		2N3822		Process NJ32		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	V_{GS} = – 30V, V_{DS} = ØV	
			– 0.1		– 0.1	µA	V_{GS} = – 30V, V_{DS} = ØV	T_A = 150°C
Gate Source Voltage	V_{GS}	– 0.5	– 2			V	V_{DS} = 15V, I_D = 50 µA	
				– 1	– 4	V	V_{DS} = 15V, I_D = 200 µA	
						V	V_{DS} = 15V, I_D = 400 µA	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 4		– 6	V	V_{DS} = 15V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	2.5	2	10	mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$					nA	V_{DS} = 15V, V_{GS} = – 8V	
						µA	V_{DS} = 15V, V_{GS} = – 8V	T_A = 150°C
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$					Ω	V_{GS} = ØV, I_D = ØV	f = 1 kHz
Common Source Forward Transconductance	g_{fs}	1500	4500	3000	6500	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Forward Transmittance	$\lvert Y_{fs} \rvert$	1500		3000		µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
Common Source Output Conductance	g_{os}		10		20	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		6		6	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		2		2	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		200		200	nV/√Hz	V_{DS} = 15V, V_{GS} = ØV	f = 10 Hz
Noise Figure	NF		5		5	dB	V_{DS} = 15V, V_{GS} = ØV R_G = 1MΩ	f = 10 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°C

Reverse Gate Source & Reverse Gate Drain Voltage	– 50 V
Continuous Forward Gate Current	10 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2 mW/°C

At 25°C free air temperature:		2N3823		2N3824		Process NJ32		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 50		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.5		– 0.1	nA	V_{GS} = – 30 V, V_{DS} = ØV	
			– 0.5		– 0.1	µA	V_{GS} = – 30 V, V_{DS} = ØV	T_A = 150°C
Gate Source Voltage	V_{GS}	– 1	– 7.5			V	V_{DS} = 15 V, I_D = 400 µA	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 8			V	V_{DS} = 15 V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	4	20			mA	V_{DS} = 15 V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$				0.1	nA	V_{DS} = 15 V, V_{GS} = – 8 V	
					0.1	µA	V_{DS} = 15 V, V_{GS} = – 8 V	T_A = 150°C
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$				250	Ω	V_{GS} = ØV, I_D = Ø V	f = 1 kHz
Common Source Forward Transconductance	g_{fs}	3500	6500			µS	V_{DS} = 15 V, V_{GS} = ØV	f = 1 kHz
Common Source Forward Transmittance	$\lvert Y_{fs} \rvert$	3200				µS	V_{DS} = 15 V, V_{GS} = ØV	f = 100 MHz
Common Source Output Conductance	g_{os}		35			µS	V_{DS} = 15 V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		6		6	pF	V_{DS} = 15 V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		2		3	pF	V_{DS} = 15 V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		200			nV/√Hz	V_{DS} = 15 V, V_{GS} = ØV	f = 10 Hz
Noise Figure	NF		6			dB	V_{DS} = 15 V, V_{GS} = ØV R_G = 1 MΩ	f = 10 Hz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate, 4 Case

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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°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/°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100		– 100	pA	V_{GS} = – 30V, V_{DS} = ØV	
			– 500		– 500		– 500	nA	V_{GS} = – 30V, V_{DS} = ØV	T_A = 125°C
Gate Operating Current	I_G		– 50		– 50		– 50	pA	V_{DS} = 20V, I_D = 200 µA	
			– 250		– 250		– 250	nA	V_{DS} = 20V, I_D = 200 µA	T_A = 125°C
Gate Source Voltage	V_{GS}		– 4.2		– 4.2		– 4.2	V	V_{DS} = 20V, I_D = 50 µA	
		– 0.5	– 4	– 0.5	– 4	– 0.5	– 4	V	V_{DS} = 20V, I_D = 200 µA	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 4.5	– 1	– 4.5	– 1	– 4.5	V	V_{DS} = – 20V, I_G = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$		2		2		2	V	V_{DS} = ØV, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	5	0.5	5	0.5	5	mA	V_{DS} = 20V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	1000	3000	1000	3000	1000	3000	µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
		1000		1000		1000		µS	V_{DS} = 20V, V_{GS} = ØV	f = 200 MHz
Common Source Output Capacitance	g_{os}		35		35		35	µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4		4		4	pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Drain Gate Capacitance	C_{dgo}		1.5		1.5		1.5	pF	V_{dg} = 10V, I_S = ØA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2		1.2	pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Noise Figure	NF		0.5		0.5		0.5	dB	V_{DS} = 20V, V_{GS} = ØV, R_g = 10 MΩ	f = 100 Hz
Differential Gate Current	$\lvert I_{G1} - I_{G2} \rvert$		10		10		10	nA	V_{DS} = 20V, I_D = 200µA	T_A = 125°C
Saturation Drain Current Ratio	I_{DSS1}/I_{DSS2}	0.95	1	0.95	1	0.95	1		V_{DS} = 20V, V_{GS} = ØV	
Differential Gate Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$		5		10		15	mV	V_{DS} = 20V, I_D = 200µA	
Differential Gate Source Voltage with Temperature	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		0.8		2		4	mV/°C	V_{DS} = 20V, I_D = 200µA	T_A = 25°C to = – 55°C
			1		2.5		5	mV/°C	V_{DS} = 20V, I_D = 200µA	T_A = 25°C to = +125°C
Transconductance Ratio	g_{fs1}/g_{fs2}	0.97	1	0.97	1	0.97	1		V_{DS} = 20V, I_D = 200µA	f = 1 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°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/°C

At 25°C free air temperature:		2N3957		2N3958		Process NJ16		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	V_{GS} = – 30 V, V_{DS} = ØV	
			– 500		– 500	nA	V_{GS} = – 30 V, V_{DS} = ØV	T_A = 125°C
Gate Operating Current	I_G		– 50		– 50	pA	V_{DS} = 20 V, I_D = 200 µA	
			– 250		– 250	nA	V_{DS} = 20 V, I_D = 200 µA	T_A = 125°C
Gate Source Voltage	V_{GS}		– 4.2		– 4.2	V	V_{DS} = 20 V, I_D = 50 µA	
		– 0.5	– 4	– 0.5	– 4	V	V_{DS} = 20 V, I_D = 200 µA	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 4.5	– 1	– 4.5	V	V_{DS} = 20 V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$		2		2	V	V_{DS} = Ø, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	5	0.5	5	mA	V_{DS} = 20 V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transconductance	g_{fs}	1000	3000	1000	3000	µS	V_{DS} = 20 V, V_{GS} = ØV	f = 1 kHz
		1000		1000		µS	V_{DS} = 20 V, V_{GS} = ØV	f = 200 MHz
Common Source Output Conductance	g_{os}		35		35	µS	V_{DS} = 20 V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4		4	pF	V_{DS} = 20 V, V_{GS} = ØV	f = 1 MHz
Drain Gate Capacitance	C_{dgo}		1.5		1.5	pF	V_{DS} = 10 V, I_S = ØA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	V_{DS} = 20 V, V_{GS} = ØV	f = 1 MHz
Noise Figure	NF		0.5		0.5	dB	V_{DS} = 20 V, V_{GS} = ØV R_G = 10 MΩ	f = 100 Hz
Differential Gate Current	$\lvert I_{G1} - I_{G2} \rvert$		10		10	nA	V_{DS} = 20 V, I_D = 200 µA	T_A = 125°C
Saturation Drain Current Ratio	I_{DSS1} / I_{DSS2}	0.9	1	0.85	1		V_{DS} = 20 V, V_{GS} = ØV	
Differential Gate Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$		20		25	mV	V_{DS} = 20 V, I_D = 200 µA	
Differential Gate Source Voltage with Temperature	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		6		8	mV	V_{DS} = 20 V, I_D = 200 µA	T_A = 25°C to – 55°C
			7.5		10	mV	V_{DS} = 20 V, I_D = 200 µA	T_A = 25°C to 125°C
Transconductance Ratio	g_{fs1} / g_{fs2}	0.9	1	0.85	1		V_{DS} = 20 V, I_D = 200 µA	f = 1 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

2N3993, 2N3993A

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- High Speed Commutators

Absolute maximum ratings at T_A = 25°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:		2N3993		2N3993A		Process PJ99		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	25		25		V	I_G = 1 µA, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	4	9.5	4	9.5	V	V_{DS} = – 10V, I_D = – 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 10		– 10		mA	V_{DS} = – 10V, V_{GS} = ØV	
Drain Reverse Current	I_{DGO}		– 1.2		– 1.2	nA	V_{DG} = – 15V, I_S = ØA	
			– 1.2		– 1.2	µA	V_{DG} = – 15V, I_S = ØA	T_A = 150°C
Drain Cutoff Current	$I_{D(OFF)}$		– 1.2		– 1.2	nA	V_{DS} = – 10V, V_{GS} = 10 V	
			– 1		– 1	µA	V_{DS} = – 10V, V_{GS} = 10 V	T_A = 150°C
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$		150		150	Ω	V_{GS} = ØV, I_D = Ø A	f = 1 kHz
Common Source Forward Transmittance	$\lvert Y_{fs} \rvert$	6	12	7	12	mS	V_{DS} = – 10V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		16		12	pF	V_{DS} = – 10V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		4.5		3	pF	V_{DS} = Ø, V_{GS} = 10V	f = 1 MHz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Gate, 3 Drain, 4 Case

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2N3994, 2N3994A

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- High Speed Commutators

Absolute maximum ratings at T_A = 25°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:		2N3994		2N3994A		Process PJ99		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	25		25		V	I_G = 1 µA, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	1	5.5	1	5.5	V	V_{DS} = – 10V, I_D = – 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 2		– 2		mA	V_{DS} = – 10V, V_{GS} = ØV	
Drain Reverse Current	I_{DGO}		– 1.2		– 1.2	nA	V_{DG} = – 15V, I_S = ØA	
			– 1.2		– 1.2	µA	V_{DG} = – 15V, I_S = ØA	T_A = 150°C
Drain Cutoff Current	$I_{D(OFF)}$		– 1.2		– 1.2	nA	V_{DS} = – 10V, V_{GS} = 10V	
			– 1		– 1	µA	V_{DS} = – 10V, V_{GS} = 10V	T_A = 150°C
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$		300		300	Ω	V_{GS} = ØV, I_D = ØA	f = 1 kHz
Common Source Forward Transmittance	$\lvert Y_{fs} \rvert$	4	10	5	10	mS	V_{DS} = – 10V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		16		12	pF	V_{DS} = – 10V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		5		3.5	pF	V_{DS} = Ø, V_{GS} = 10V	f = 1 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°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/°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current 2N4117, 2N4118, 2N4119	I_{GSS}		– 10		– 10		– 10	pA	V_{GS} = – 20V, V_{DS} = ØV	
2N4117A, 2N4118A, 2N4119A			– 1		– 1		– 1	pA	V_{GS} = – 20V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.6	– 1.8	– 1	– 3	– 2	– 6	V	V_{DS} = 10V, I_D = 1 nA	
Drain Saturation Current (Pulsed) 2N4117, 2N4118, 2N4119	I_{GSS}	0.03	0.09	0.08	0.24	0.2	0.6	mA	V_{DS} = 10V, V_{GS} = ØV	
2N4117A, 2N4118A, 2N4119A		0.015	0.09	0.08	0.24	0.2	0.6	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	70	210	80	250	100	330	µS	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		3		5		10	µS	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		3		3		3	pF	V_{DS} = 10V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1.5		1.5		1.5	pF	V_{DS} = 10V, V_{GS} = ØV	f = 1 MHz

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

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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°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:		2N4220 2N4220A		2N4221 2N4221A		2N4222 2N4222A				
		NJ16		NJ16		NJ32		Process		
Static Electrical Characteristics		Min	Max	Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 30		– 30		V	I_G = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1		– 0.1	nA	V_{GS} = – 15V, V_{DS} = ØV	
			– 0.1		– 0.1		– 0.1	µA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Voltage	V_{GS}	– 0.5 (50)	– 2.5 (50)	– 1 (200)	– 5 (200)	– 2 (500)	– 6 (500)	V µA	V_{DS} = 15V, I_D = ( )	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 4		– 6		– 8	V	V_{DS} = 15V, I_D = 0.1 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.5	3	2	6	5	15	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	1000	4000	2000	5000	2500	6000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Forward Transmittance	$\lvert Y_{fs} \rvert$	750		750		750		µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
Common Source Output Conductance	g_{os}		10		20		40	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		6		6		6	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		2		2		2	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Noise Figure **2N4220A, 2N4221A, 2N4222A**	NF		2.5		2.5		2.5	dB	V_{DS} = 15V, V_{GS} = ØV R_G = 1 MΩ	f = 100 MHz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate, 4 Case

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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°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/°C

At 25°C free air temperature:		2N4339		2N4339		Process NJ16		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	V_{GS} = – 30V, V_{DS} = ØV	
			– 100		– 100	nA	V_{GS} = – 30V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3	– 1	– 0.6	– 1.8	V	V_{DS} = 15V, I_D = 0.1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.2	0.6	0.5	1.5	mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		0.05 (– 5)		0.05 (– 5)	nA V	V_{DS} = 15V, V_{GS} = ( )	
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$		2500		1700	Ω	V_{GS} = ØV, I_D = Ø A	f = 1 kHz
Common Source Forward Transconductance	g_{fs}	600	1800	800	2400	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		5		15	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		7		7	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		3		3	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Noise Figure	NF		1		1	dB	V_{DS} = 15V, V_{GS} = ØV R_G = 1 MΩ, BW = 200 Hz	f = 1 kHz

TO-18 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate & Case

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2N4340, 2N4341

N-Channel Silicon Junction Field-Effect Transistor

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

Absolute maximum ratings at T_A = 25°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/°C

At 25°C free air temperature:		2N4340		2N4341		Process NJ16		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 50		– 50		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	V_{GS} = – 30 V, V_{DS} = ØV	
			– 100		– 100	nA	V_{GS} = – 30 V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 3	– 2	– 6	V	V_{DS} = 15 V, I_D = 0.1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	1.2	3.6	3	9	mA	V_{DS} = 15 V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		0.05 (– 5)		0.07 (– 10)	nA V	V_{DS} = 15 V, V_{GS} = ( )	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		1500		800	Ω	V_{GS} = ØV, I_D = Ø A	f = 1 kHz
Common Source Forward Transconductance	g_{fs}	1300	3000	2000	4000	µS	V_{DS} = 15 V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		30		60	µS	V_{DS} = 15 V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		7		7	pF	V_{DS} = 15 V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		3		3	pF	V_{DS} = 15 V, V_{GS} = ØV	f = 1 MHz
Noise Figure	NF		1		1	dB	V_{DS} = 15 V, V_{GS} = ØV R_G = 1 MΩ, BW = 200 Hz	f = 1 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°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100		– 100	pA	V_{GS} = – 20V, V_{DS} = ØV	
			– 200		– 200		– 200	nA	V_{GS} = – 20V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 2	– 5	– 0.5	– 3	V	V_{DS} = – 20V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$		1		1		1	V	I_G = 1 mA, V_{DS} = ØV	
Drain Saturation Current (Pulsed)	I_{DSS}	50	150	25	75	5	30	mA	V_{DS} = 20V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$						100	pA	V_{DS} = 20V, V_{GS} = – 5V	
							200	nA	V_{DS} = 20V, V_{GS} = – 5V	T_A = 150°C
					100			pA	V_{DS} = 20V, V_{GS} = – 7V	
					200			nA	V_{DS} = 20V, V_{GS} = – 7V	T_A = 150°C
			100					pA	V_{DS} = 20V, V_{GS} = – 12V	
			200					nA	V_{DS} = 20V, V_{GS} = – 12V	T_A = 150°C
Drain Source ON Voltage	$V_{DS(ON)}$						0.4	V	V_{GS} = ØV, I_D = 3 mA	
					0.4			V	V_{GS} = ØV, I_D = 6 mA	
			0.4					V	V_{GS} = ØV, I_D = 12 mA	
Static Drain Source ON Resistance	$r_{DS(ON)}$		30		60		100	Ω	V_{GS} = ØV, I_D = 1 mA	
Dynamic Electrical Characteristics										
Drain Source ON Resistance	$r_{ds(on)}$		30		60		100	Ω	V_{GS} = ØV, I_D = ØA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		14		14		14	pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Reverse Transfer Capacitance	C_{rss}						3.5	pF	V_{DS} = ØV, V_{GS} = – 5V	f = 1 kHz
					3.5			pF	V_{DS} = ØV, V_{GS} = – 7V	f = 1 kHz
			3.5					pF	V_{DS} = ØV, V_{GS} = – 12V	f = 1 kHz
Switching Characteristics										
Turn ON Delay Time	$t_{d(on)}$		15		15		15	ns	V_{DD} = 10V, $V_{GS(ON)}$ = ØV	
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		

	2N4391	2N4392	2N4393	
$I_{D(ON)}$	12	6	3	mA
$V_{GS(OFF)}$	– 12	– 7	– 5	V

TO-18 Package
See Section G for Outline Dimensions

Surface Mount
SMP4391, SMP4392, SMP4393

Pin Configuration
1 Source, 2 Drain, 3 Gate & Case

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2N4416, 2N4416A

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- VHF Amplifiers

Absolute maximum ratings at T_A = 25°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:		2N4416		2N4416A		Process NJ26		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 35		V	I_G = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	V_{GS} = – 20V, V_{DS} = ØV	
			– 0.1		– 0.1	µA	V_{GS} = – 20V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 6	– 2.5	– 6	V	V_{DS} = 15V, I_D = 1 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5	15	5	15	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transconductance	g_{fs}	4500	7500	4500	7500	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
		4000		4000		µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Output Conductance	g_{os}		50		50	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
			75		75	µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			100		100	µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Input Capacitance	C_{iss}		4		4	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Output Capacitance	C_{oss}		2		2	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		0.8		0.8	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Input Conductance	g_{is}		100		100	µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			1000		1000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Input Susceptance	b_{is}		2500		2500	µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			10000		10000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Output Susceptance	b_{os}		1000		1000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			4000		4000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Power Gain	G_{ps}	18		18		dB	V_{DS} = 15V, I_D = 5mA	f = 100 MHz
		10		10		dB	V_{DS} = 15V, I_D = 5mA	f = 400 MHz
Noise Figure	NF		2		2	dB	V_{DS} = 15V, I_D = 5mA R_G = 1kΩ	f = 100 MHz
			4		4	dB		f = 400 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.

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

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at T_A = 25°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**	$V_{(BR)GSS}$		– 40		– 40		– 40	V	I_G = – 1 µA, V_{DS} = ØV	
2N4859, 2N4860, 2N4861			– 30		– 30		– 30	V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current **2N4856, 2N4857, 2N4858**	I_{GSS}		– 250		– 250		– 250	pA	V_{GS} = – 20V, V_{DS} = ØV	
			– 500		– 500		– 500	nA	V_{GS} = – 20V, V_{DS} = ØV	T_A = 150°C
Gate Reverse Current **2N4859, 2N4860, 2N4861**	I_{GSS}		– 250		– 250		– 250	pA	V_{GS} = – 15V, V_{DS} = ØV	
			– 500		– 500		– 500	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 2	– 6	– 0.8	– 4	V	V_{DS} = 15V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	50		20	100	8	80	mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		250		250		250	pA	V_{DS} = 15V, V_{GS} = – 10V	
			500		500		500	nA	V_{DS} = 15V, V_{GS} = – 10V	T_A = 150°C
Drain Source ON Voltage	$V_{DS(ON)}$		0.75 (20)		0.5 (10)		0.5 (5)	V (mA)	V_{GS} = ØV, I_D = ( )	
Dynamic Electrical Characteristics										
Common Source ON Resistance	$r_{ds(on)}$		25		40		60	Ω	V_{GS} = ØV, I_D = Ø A	f = 1 kHz
Common Source Input Capacitance	C_{iss}		18		18		18	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		8		8		8	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Switching Characteristics										
Turn ON Delay Time	$t_{d(on)}$		6 (20) [–10]		6 (10) [– 6]		10 (5) [– 4]	ns (mA) [V]	V_{DD} = 10V, V_{GS} = ØV $I_{D(ON)}$ = ( ) $V_{GS(OFF)}$ = [ ] **(2N4856, 2N4859)** R_L = 465Ω **(2N4857, 2N4860)** R_L = 953Ω **(2N4858, 2N4861)** R_L = 1910Ω	
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

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

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at T_A = 25°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 mA/°C	10 mA/°C

At 25°C free air temperature:		2N4856A 2N4859A		2N4857A 2N4860A		2N4858A 2N4861A		Process NJ132		
Static Electrical Characteristics		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 µA, V_{DS} = ØV	
Gate Source Breakdown Voltage **2N4859A, 2N4860A, 2N4861A**	$V_{(BR)GSS}$		– 30		– 30		– 30	V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current **2N4856A, 2N4857A, 2N4858A**	I_{GSS}		– 250		– 250		– 250	pA	V_{GS} = – 20V, V_{DS} = ØV	
			– 500		– 500		– 500	nA	V_{GS} = – 20V, V_{DS} = ØV	T_A = 150°C
Gate Reverse Current **2N4859A, 2N4860A, 2N4861A**	I_{GSS}		– 250		– 250		– 250	pA	V_{GS} = – 15V, V_{DS} = ØV	
			– 500		– 500		– 500	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 2	– 6	– 0.8	– 4	V	V_{DS} = 15V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	50		20	100	8	80	mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		250		250		250	pA	V_{DS} = 15V, V_{GS} = – 10V	
			500		500		500	nA	V_{DS} = 15V, V_{GS} = – 10V	T_A = 150°C
Drain Source ON Voltage	$V_{DS(ON)}$		0.75 (20)		0.5 (10)		0.5 (5)	V (mA)	V_{GS} = ØV, I_D = ( )	
Dynamic Electrical Characteristics										
Common Source ON Resistance	$r_{ds(on)}$		25		40		60	Ω	V_{GS} = ØV, I_D = Ø A	f = 1 kHz
Common Source Input Capacitance	C_{iss}		10		10		10	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		4		3.5		3.5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Switching Characteristics										
Turn ON Delay Time	$t_{d(on)}$		5 (20) [–10]		6 (10) [– 6]		8 (5) [– 4]	ns (mA) [V]	V_{DD} = 10V, V_{GS} = ØV $I_{D(ON)}$ = ( ) $V_{GS(OFF)}$ = [ ] **(2N4856A, 2N4859A)** R_L = 464Ω **(2N4857A, 2N4860A)** R_L = 953Ω **(2N4858A, 2N486A1)** R_L = 1910Ω	
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°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.25		– 0.25		– 0.25	nA	V_{GS} = – 30V, V_{DS} = ØV	
			– 0.25		– 0.25		– 0.25	µA	V_{GS} = – 30V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.7	– 2	– 1	– 3	– 1.8	– 5	V	V_{DS} = 20V, I_D = 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.4	1.2	1	3	2.5	7.5	mA	V_{DS} = 20V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	700	2000	1000	3000	1300	4000	µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		1.5		4		10	µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		25		25		25	pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		5		5		5	pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20		20	nV/√HZ	V_{DS} = 10V, V_{GS} = ØV	f = 10 Hz
			10		10		10	nV/√HZ	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz
Noise Figure	NF		1		1		1	dB	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz
									(2N4867, 68, 69) R_G = 20 kΩ **(2N4867A, 68A, 69A)** R_G = 5 kΩ	

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

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2N5020, 2N5021

P-Channel Silicon Junction Field-Effect Transistor

- Analog Switches

Absolute maximum ratings at T_A = 25°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:		2N5020		2N5021		Process PJ32		
Static Electrical Characteristics		Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GDO}$	25		25		V	I_G = 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		1		1	nA	V_{GS} = 15 V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	0.3	1.5	0.5	2.5	V	V_{DS} = – 15 V, I_D = 1 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 0.3	– 1.2	– 1	– 3.5	mA	V_{DS} = – 15 V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transconductance	g_{fs}	1	3.5	1.5	6	mS	V_{DS} = – 15 V, V_{GS} = ØV	
Common Source Output Conductance	g_{os}		20		20	µS	V_{DS} = – 15 V, V_{GS} = ØV	
Common Source Input Capacitance	C_{iss}		25		25	pF	V_{DS} = – 15 V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		7		7	pF	V_{DS} = – 15 V, V_{GS} = ØV	f = 1 MHz

TO-18 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source 1, 2 Gate & Case, 3 Drain

Surface Mount
SMP5020, SMP5021

InterFET Corporation
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2N5114, 2N5115, 2N5116

P-Channel Silicon Junction Field-Effect Transistor

- Analog Switches

Absolute maximum ratings at T_A = 25°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		500		500		500	pA	V_{GS} = 20V, V_{DS} = ØV	
			1		1		1	µA	V_{GS} = 20V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	5	10	3	6	1	4	V	V_{DS} = – 15V, I_G = – 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$		– 1		– 1		– 1	V	V_{DS} = ØV, I_G = – 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 30	– 90					mA	V_{GS} = ØV, V_{DS} = – 18V	
				– 15	– 60	– 5	– 25	mA	V_{GS} = ØV, V_{DS} = – 15V	
Drain Cutoff Current	$I_{D(OFF)}$		– 500					pA	V_{DS} = – 15V, V_{GS} = 12V	
			– 1					µA	V_{DS} = – 15V, V_{GS} = 12V	T_A = 150°C
					– 500			pA	V_{DS} = – 15V, V_{GS} = 7V	
					– 1			µA	V_{DS} = – 15V, V_{GS} = 7V	T_A = 150°C
							– 500	pA	V_{DS} = – 15V, V_{GS} = 5V	
							– 1	µA	V_{DS} = – 15V, V_{GS} = 5V	T_A = 150°C
Drain Source ON Voltage	$V_{DS(ON)}$		– 1.3					V	V_{GS} = ØV, I_D = – 15 mA	
					– 0.8			V	V_{GS} = ØV, I_D = – 7 mA	
							– 0.6	V	V_{GS} = ØV, I_D = – 3 mA	
Static Drain Source ON Resistance	$r_{DS(ON)}$		75		100		150	Ω	V_{GS} = ØV, I_D = – 1 mA	
Dynamic Electrical Characteristics										
Drain Source ON Resistance	$r_{ds(on)}$		75		100		150	Ω	V_{GS} = ØV, I_D = ØA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		25		25		27	pF	V_{DS} =– 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		7					pF	V_{DS} = ØV, V_{GS} = 12V	f = 1 MHz
					7			pF	V_{DS} = ØV, V_{GS} = 7 V	f = 1 MHz
							7	pF	V_{DS} = ØV, V_{GS} = 5V	f = 1 MHz

Switching Characteristics										2N5114	2N5115	2N5116	
Turn ON Delay Time	$t_{d(on)}$		6		10		25	ns	V_{DD}	– 10	– 6	– 6	V
Rise Time	t_r		10		20		35	ns	V_{GG}	20	12	8	V
Turn OFF Delay Time	$t_{d(off)}$		6		8		20	ns	R_L	130	910	2000	Ω
Fall Time	t_f		15		30		60	ns	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°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:		2N5397		2N5398		Process NJ26L		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Source Forward Voltage	$V_{GS(F)}$		1		1	V	I_G = 1 mA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	V_{GS} = – 15V, V_{DS} = ØV	
			– 0.1		– 0.1	µA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 6	– 1	– 6	V	V_{DS} = 10V, I_D = 1 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	10	30	5	40	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transconductance	g_{fs}	5.5	9	5	10	mS	V_{DG} = 10V, I_D = 10 mA	f = 450 MHz
Common Source Forward Transfer Admittance	$\lvert Y_{fs} \rvert$	6	10	5.5	10	mS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Source Output Conductance	$\lvert g_{os} \rvert$		0.4		0.5	mS	V_{DG} = 10V, I_D = 10 mA	f = 450 MHz
Common Source Input Admittance	$\lvert Y_{os} \rvert$		0.2		0.4	mS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Source Input Conductance	g_{is}		2		3	mS	V_{DG} = 10V, I_D = 10 mA	f = 450 MHz
Common Source Input Capacitance	C_{iss}		5		5.5	pF	V_{DG} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.3	pF	V_{DG} = 15V, V_{GS} = ØV	f = 1 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	40 V
Continuous Forward Gate Current	– 10 mA
Continuous Device Power Dissipation	310 mW
Power Derating	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 = 10µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		5		5		5	nA	V_{GS} = 20V, V_{DS} = ØV	
			1		1		1	µA	V_{GS} = 20V, V_{DS} = ØV	T_A = 100°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	0.75	6	1	7.5	1.8	9	V	V_{DS} = – 15V, I_D = – 1 µA	
Gate Source Voltage	V_{GS}	0.8	4.5					V	V_{DS} = – 15V, I_D = – 100 µA	
				0.8	4.5			V	V_{DS} = – 15V, I_D = – 200 µA	
						1.5	6	V	V_{DS} = – 15V, I_D = – 400 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 1	– 5	– 2	– 9	– 4	– 16	mA	V_{DS} = – 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Drain Source ON Resistance	$r_{ds(on)}$		2		0.8		0.4	kΩ	V_{GS} = ØV, I_D = Ø A	f = 1 kHz
Common Source Forward Transadmittance	$\|Y_{fs}\|$	1	4	1.5	5	2	6	mS	V_{DS} = – 15V, V_{GS} = Ø V	f = 1 kHz
Common Source Output Admittance	$\|Y_{os}\|$		75		75		75	µS	V_{DS} = – 15V, V_{GS} = Ø V	f = 1 kHz
Common Source Input Capacitance	C_{iss}		7		7		7	pF	V_{DS} = – 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		2		2		2	pF	V_{DS} = – 15V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		2.5		2.5		2.5	dB	V_{DS} = – 15V, V_{GS} = ØV	f = 100 Hz, BW = 1 Hz
Noise Figure	NF		115		115		115	nV/√Hz	V_{DS} = – 15V, V_{GS} = ØV, R_G = 1MΩ	f = 100 Hz

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMP5460, SMP5461, SMP5462

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2N5484, 2N5485, 2N5486

N-Channel Silicon Junction Field-Effect Transistor

- VHF/UHF Amplifiers

Absolute maximum ratings at T_A = 25°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 = 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 1		– 1		– 1	nA	V_{GS} = – 20V, V_{DS} = ØV	
			– 0.2		– 0.2		– 0.2	µA	V_{GS} = – 20V, V_{DS} = ØV	T_A = 100°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3	– 3	– 0.5	– 4	– 2	– 6	V	V_{DS} = 15V, I_D = 10 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	1	5	4	10	8	20	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Forward Transconductance	$R_{e(Yfs)}$	2500						µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
				3000		3500		µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Forward Transadmittance	Y_{fs}	3000	6000	3500	7000	4000	8000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Input Admittance	$R_{e(Yis)}$		100					µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
					1000		1000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Output Conductance	$R_{e(Yos)}$		75					µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
					100		100	µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Output Admittance	Y_{os}		50		60		75	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Input Capacitance	C_{iss}		5		5		5	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1		1		1	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Output Capacitance	C_{oss}		2		2		2	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 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°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:		2N5911		2N5912		Process NJ30L or NJ36D		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	V_{GS} = – 15V, V_{DS} = ØV	
			– 250		– 250	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Operating Current	I_G		– 100		– 100	pA	V_{DG} = 10V, I_D = 5 mA	
			– 100		– 100	nA	V_{DG} = 10V, I_D = 5 mA	T_A = 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 5	– 1	– 5	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Voltage	V_{GS}	– 0.3	– 4	– 0.3	– 4	V	V_{DS} = 10V, I_D = 5 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	7	40	7	40	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transconductance	g_{fs}	5000	10000	5000	10000	µS	V_{DG} = 10V, I_D = 5 mA	f = 1 kHz
		5000	10000	5000	10000	µS	V_{DG} = 10V, I_D = 5 mA	f = 100 MHz
Common Source Output Conductance	g_{os}		100		100	µS	V_{DG} = 10V, I_D = 5 mA	f = 1 kHz
			150		150	µS	V_{DG} = 10V, I_D = 5 mA	f = 100 MHz
Common Source Input Capacitance	C_{iss}		5		5	pF	V_{DG} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	V_{DG} = 10V, I_D = 5 mA	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20	nV/√Hz	V_{DG} = 10V, I_D = 5 mA	f = 10 kHz
Noise Figure	NF		1		1	dB	V_{DG} = 10V, I_D = 5 mA R_G = 100 KΩ	f = 10 kHz
Differential Gate Current	$I_{G1} - I_{G2}$		20		20	nA	V_{DG} = 10V, I_D = 5 mA	T_A = 125°C
Saturation Drain Current Ratio	I_{DSS1} / I_{DSS2}	0.95	1	0.95	1		V_{DG} = 20V, V_{GS} = ØV	
Differential Gate Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$		10		15	mV	V_{DG} = 10V, I_D = 5 mA	
Gate Source Voltage Differential Drift	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		20		40	mV	V_{DG} = 10V, I_D = 5 mA	T_A = 25°C, T_B = 125°C
			20		40	mV	V_{DG} = 10V, I_D = 5 mA	T_A = – 55°C, T_B = 25°C
Transconductance Ratio	g_{fs1} / g_{fs2}	0.9	1	0.85	1		V_{DG} = 10V, I_D = 5 mA	f = 1 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

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2N6449, 2N6450

N-Channel Silicon Junction Field-Effect Transistor

- **High Voltage**

Absolute maximum ratings at T_A = 25°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:		2N6449		2N6450		Process NJ42		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 300		– 200		V	I_G = – 10 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100			nA	V_{GS} = – 150V, V_{DS} = ØV	
					– 100	nA	V_{GS} = – 100V, V_{DS} = ØV	
			– 100			µA	V_{GS} = – 150V, V_{DS} = ØV	T_A = 150°C
					– 100	µA	V_{GS} = – 100V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2	– 15	– 2	– 15	V	V_{DS} = 30V, I_D = 4 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	2	10	2	10	mA	V_{DS} = 30V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transfer Admittance	Y_{fs}	0.5	3	0.5	3	mS	V_{DS} = 30V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	Y_{os}		100		100	µS	V_{DS} = 30V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		20		20	pF	V_{DS} = 30V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		2.5		2.5	pF	V_{DS} = 30V, V_{GS} = ØV	f = 1 MHz

TO-39 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate & Case

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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°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:		2N6451		2N6452		Process NJ132L		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1			nA	V_{GS} = – 10V, V_{DS} = ØV	
					– 0.5	nA	V_{GS} = – 15V, V_{DS} = ØV	
			– 0.2			µA	V_{GS} = – 10V, V_{DS} = ØV	T_A = 125°C
					– 1	µA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5	– 3.5	– 0.5	– 3.5	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	5	20	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transmittance	$\lvert Y_{fs} \rvert$	15	30	15	30	mS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
						mS	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Common Source Output Conductance	$\lvert Y_{os} \rvert$		50		50	µS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
						µS	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		25		25	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
						pF	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Common Source Reverse Transfer Capacitance	C_{rss}		5		5	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
						pF	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5		10	nV/√Hz	V_{DS} = 10V, I_D = 5 mA	f = 10 kHz
			3		8	nV/√Hz	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
Noise Figure	NF		1.5		2.5	dB	V_{DS} = 10V, I_D = 5 mA R_G = 10 kΩ	f = 10 Hz

TO-72 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate, 4 Case

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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°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:		2N6453		2N6454		Process NJ132L		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1			nA	V_{GS} = – 10V, V_{DS} = ØV	
					– 0.5	nA	V_{GS} = – 15V, V_{DS} = ØV	
			– 0.2			µA	V_{GS} = – 10V, V_{DS} = ØV	T_A = 125°C
					– 1	µA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.75	– 5	– 0.75	– 5	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	15	50	15	50	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transmittance	$\lvert Y_{fs} \rvert$					mS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
		20	40	20	40	mS	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Common Source Output Conductance	$\lvert Y_{os} \rvert$					µS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
			100		100	µS	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}					pF	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
			25		25	pF	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Common Source Reverse Transfer Capacitance	C_{rss}					pF	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
			5		5	pF	V_{DS} = 10V, I_D = 15 mA	f = 1 kHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5		10	nV/√Hz	V_{DS} = 10V, I_D = 5 mA	f = 10 kHz
			3		8	nV/√Hz	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
Noise Figure	NF		1.5		2.5	dB	V_{DS} = 10V, I_D = 5 mA R_G = 10 kΩ	f = 10 Hz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate, 4 Case

InterFET Corporation
1000 N. Shiloh Road, Garland, TX 75042
(972) 487-1287 FAX (972) 276-3375
www.interfet.com

2N6550

N-Channel Silicon Junction Field-Effect Transistor

- **Low-Noise, High Gain Amplifier**

Absolute maximum ratings at T_A =25°C

Reverse Gate Source & Reverse Gate Drain Voltage	– 20 V
Continuious 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:		2N6550			Process NJ450L		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20			V	I_G = 10 µA, V_{DS} = ØV	
Gate Leakage Current	I_{GSS}			– 3	nA	V_{GS} = – 10V, V_{DS} = ØV	
				– 0.1	µA	V_{GS} = – 10V, V_{DS} = ØV	T_A = 85°C
Zero Gate Voltage Drain Current (Pulsed)	I_{DSS}	10	100	250	mA	V_{DS} = 10V, V_{GS} = Ø V	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3		– 3	V	V_{DS} = 10V, I_D = 0.1 mA	
Dynamic Electrical Characteristics							
Transconductance	g_{fs}	25		150	mS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Source Output Conductance	$\|Y_{os}\|$			150	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		30	35	pF	V_{DS} = 10V, I_D = 10 mA	f = 140 kHz
Common Source Reverse Transfer Capacitance	C_{rss}		10	20	pF	V_{DS} = 10V, V_{DS} = ØV	f = 140 kHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		1.4	2	nV/√Hz	V_{DS} = 5V, I_D = 10 mA	f = 1 kHz
			6	10	nV/√Hz	V_{DS} = 5V, I_D = 10 mA	f = 10 Hz
	$\bar{e}_N$ Total		0.4	0.6	µVrms	V_{DS} = 5V, I_D = 10 mA	f = 10 kHz to 20 kHz
Equivalent Open Circuit Input Noise Current	$\bar{i}_N$		0.1		pA/√Hz	R_S < 100 KΩ	f = 1 kHz

TO-46 Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate & Case

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IF140, IF140A

N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise, High Gain Amplifiers

Absolute maximum ratings at T_A = 25°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:		IF140		IF140A		Process NJ14AL		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1		– 0.1	nA	V_{GS} = – 15V, V_{DS} = ØV	
			– 0.2		– 0.2	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 6		– 6	V	V_{DS} = 15V, I_D = 5 nA	
Gate Source Voltage	V_{GS}		– 5	– 2.5	– 6	V	V_{DS} = 15V, I_D = 50 µA	
Gate Source Forward Voltage	$V_{GS(F)}$		1		1	V	V_{DS} = Ø, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	5	15	5	15	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transmittance	Y_{fs}	4.5		4.5		mS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	Y_{os}		0.05		0.05	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		3		3	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		0.6		0.6	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
		Typ		**Typ**				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	4		4		nV/√Hz	V_{DS} = 12V, V_{GS} = ØV	f = 10 Hz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate, 4 Case

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IF142

N-Channel Silicon Junction Field-Effect Transistor

- **Low-Noise, High Gain Amplifier**

Absolute maximum ratings at T_A = 25°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:		IF142		Process NJ14AL		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 15V, V_{DS} = ØV	
			– 0.2	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		– 6	V	V_{DS} = 15V, I_D = 5 nA	
Gate Source Voltage	V_{GS}		– 5	V	V_{DS} = 15V, I_D = 50 µA	
Gate Source Forward Voltage	$V_{GS(F)}$		1	V	V_{DS} = Ø, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	5	15	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transmittance	Y_{fs}	3.5		mS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	Y_{os}		0.05	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		3	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		0.6	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	4		nV/√Hz	V_{DS} = 12V, V_{GS} = ØV	f = 10 Hz

TO-236AB Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

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IF1320

N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise, High Gain Amplifier

Absolute maximum ratings at T_A = 25°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:		IF1320		Process NJ132L		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{DS} = ØV, V_{GS} = – 10V	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	15		mS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		20	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		5	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	2.5		nV/√Hz	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz

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°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:		IF1330		Process NJ132H		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{DS} = ØV, V_{GS} = – 10V	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	10		mS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		20	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		5	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	2.5		nV/√Hz	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz

TO-236AB Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

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IF1331

N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise, High Gain Amplifier

Absolute maximum ratings at T_A = 25°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:		IF1331		Process NJ132H		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{DS} = ØV, V_{GS} = – 10V	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5	20	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	10		mS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		20	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		5	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	2.5		nV/√Hz	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz

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:		IF1801		Process NJ1800DL		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 10V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 2	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	30		mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	50		mS	V_{DS} = 10V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		100	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		50	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.5		nV/√Hz	V_{DG} = 4V, I_D = 5 mA	f = 1 kHz

TO-52 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate & Case

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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 Min	IF3601 Max	Process NJ3600L Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 10V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 2	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	30		mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics		**Typ**				
Common Source Forward Transconductance	g_{fs}	750		mS	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}	300		pF	V_{DS} = ØV, V_{GS} = – 4V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}	200		pF	V_{DS} = ØV, V_{GS} = – 4V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.3		nV/√Hz	V_{DG} = 3V, 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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IF3602

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:		IF3602		Process NJ3600L		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.5	nA	V_{GS} = – 10V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 3	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	30		mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics		**Typ**				
Common Source Forward Transconductance	g_{fs}	750		mS	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}	300		pF	V_{DS} = ØV, V_{GS} = – 4V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}	200		pF	V_{DS} = ØV, V_{GS} = – 4V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.3		nV/√Hz	V_{DG} = 3V, I_D = 5 mA	f = 100 Hz
		Max				
Differential Gate Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$	100		mV	V_{DS} = 10V, V_{GS} = ØV	

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

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IF4500

N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise, High Gain Amplifier

Absolute maximum ratings at T_A = 25°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:		IF4500		Process NJ450L		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 30V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	V_{DS} = 15V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	15		mS	V_{DS} = 15V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		35	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		8	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/√Hz	V_{DS} = 12V, V_{GS} = ØV	f = 1 kHz

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°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:		IF4501		Process NJ450L		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 10V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	15		mS	V_{DS} = 15V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		35	pF	V_{DS} = 15V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		9	pF	V_{DS} = 15V, I_D = 5 mA	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/√Hz	V_{DG} = 12V, I_D = 5 mA	f = 1 kHz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate, 4 Case

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IF4510

N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise, High Gain Amplifier

Absolute maximum ratings at T_A = 25°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:		IF4510		Process NJ450H		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 15V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	V_{DS} = 15V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	15		mS	V_{DS} = 15V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		35	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		8	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/√Hz	V_{DG} = 12V, V_{GS} = ØV	f = 1 kHz

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°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:		IF4511		Process NJ450H		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 30V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 1.5	V	V_{DS} = 15V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5		mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	15		mS	V_{DS} = 15V, I_D = 5 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		35	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		8	pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	1.5		nV/√Hz	V_{DG} = 12V, V_{GS} = ØV	f = 1 kHz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate, 4 Case

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IF9030

N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise, High Gain Amplifier

Absolute maximum ratings at T_A = 25°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:		IF9030		Process NJ903L		
Static Electrical Characteristics		**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 0.1	nA	V_{GS} = – 10V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.35	– 2	V	V_{DS} = 10V, I_D = 0.5 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	30	300	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics						
Common Source Forward Transconductance	g_{fs}	80		mS	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		60	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		20	pF	V_{DS} = 10V, I_D = 5 mA	f = 1 MHz
		Typ				
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$	0.5		nV/√Hz	V_{DG} = 4V, I_D = 5 mA	f = 1 kHz

TO-52 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate & Case

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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°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:		IFN421, IFN422, IFN423			Process NJ01		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40	– 60		V	I_G = – 1 µA, V_{DS} = ØV	
Gate to Gate Breakdown Voltage	BV_{G1G2}	±40			V	I_G = – 1 µA, I_D = ØA, I_S = ØA	
Gate Reverse Current	I_{GSS}			– 1	pA	V_{GS} = – 20V, V_{DS} = ØV	
				– 1	nA	V_{GS} = – 20V, V_{DS} = ØV	T_A = +125°C
Gate Operating Current	I_G			– 0.25	pA	V_{DS} = 10V, I_D = 30 µA	
				– 250	pA	V_{DS} = 10V, I_D = 30 µA	T_A = +125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.4		– 2	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Voltage	V_{GS}			– 1.8	V	V_{DS} = 10V, I_D = 30 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	60		1000	µA	V_{DS} = 10V, V_{GS} = Ø V	
Dynamic Electrical Characteristics							
Common Source Forward Transconductance	g_{fs}	100		1500	µS	V_{DS} = 10V, V_{GS} = Ø V	f = 1 kHz
Common Source Output Conductance	g_{os}			3	µS	V_{DS} = 10V, I_D = 30 µA	f = 1 kHz
Common Source Input Capacitance	C_{iss}			3	pF	V_{DS} = 10V, V_{GS} = Ø V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}			1.5	pF	V_{DS} = 10V, V_{GS} = Ø V	f = 1 MHz
Equivalent Circuit Input Noise Voltage	$\bar{e}_N$		20	70	nV/√Hz	V_{DS} = 10V, I_D = 30 µA	f = 10 Hz
Noise Figure	NF			1	dB	V_{DS} = 10V, I_D = 30 µA R_G = 10 MΩ	f = 10 Hz
		Max -	**IFN421**	**IFN422**	**IFN423**		
Differential Gate Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$	10	15	25	mV	V_{DG} = 10V, I_D = 30 µA	
Differential Gate Source Voltage With Temperature	$\frac{\lvert V_{GS1} - V_{GS2} \rvert}{\Delta T}$	10	25	40	µV/°C	V_{DG} = 10V, I_D = 30 µA	T_A = – 55°C T_B = 25°C T_C = 125°C
		Min -	**IFN421**	**IFN422**	**IFN423**		
Common Mode Rejection Ratio	CMRR	90	80	80	dB	V_{DG} = 10V to 20V, I_D = 30 µA	

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°C

Device Dissapation (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:		IFN424, IFN425, IFN426			Process NJ01		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40	– 60		V	I_G = – 1 µA, V_{DS} = ØV	
Gate to Gate Breakdown Voltage	BV_{G1G2}	±40			V	I_G = – 1 µA, I_D = ØA, I_S = ØA	
Gate Reverse Current	I_{GSS}			– 3	pA	V_{GS} = – 20V, V_{DS} = ØV	
				– 3	nA	V_{GS} = – 20V, V_{DS} = ØV	T_A = +125°C
Gate Operating Current	I_G			– 0.5	pA	V_{DS} = 10V, I_D = 30 µA	
				– 500	pA	V_{DS} = 10V, I_D = 30 µA	T_A = +125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.4		– 3	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Voltage	V_{GS}			– 2.9	V	V_{DS} = 10V, I_D = 30 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	60	1800		µA	V_{DS} = 10V, V_{GS} = Ø V	
Dynamic Electrical Characteristics							
Common Source Forward Transconductance	g_{fs}	100		1500	µS	V_{DS} = 10V, V_{GS} = Ø V	f = 1 kHz
Common Source Output Conductance	g_{os}			3	µS	V_{DS} = 10V, I_D = 30 µA	f = 1 kHz
Common Source Input Capacitance	C_{iss}			3	pF	V_{DS} = 10V, V_{GS} = Ø V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}			1.5	pF	V_{DS} = 10V, V_{GS} = Ø V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20	70	nV/√Hz	V_{DS} = 10V, I_D = 30 µA	f = 10 Hz
Noise Figure	NF			1	dB	V_{DS} = 10V, I_D = 30 µA R_G = 1 MΩ	f = 10 Hz

Max -		IFN424	IFN425	IFN426			
Differential Gate Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$	10	15	25	mV	V_{DG} = 10V, I_D = 30 µA	
Differential Gate Source Voltage With Temperature	$\frac{\lvert V_{GS1} - V_{GS2} \rvert}{\Delta T}$	10	25	40	µV/°C	V_{DG} = 10V, I_D = 30 µA	T_A = – 55°C T_B = 25°C T_C = 125°C

Min -		IFN424	IFN425	IFN426			
Common Mode Rejection Ratio	CMRR	90	80	80	dB	V_{DG} = 10V to 20V, I_D = 30 µA	

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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IFN860

Dual N-Channel Silicon Junction Field-Effect Transistor

- Low-Noise Audio Amplifier
- Equivalent to Crystalonics CD860

Absolute maximum ratings at T_A = 25°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:		IFN860			Process NJ450L		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 20			V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Leakage Voltage	I_{GSS}			3	nA	V_{GS} = – 10V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3		– 3	V	V_{DS} = 10V, I_D = 100 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	10			mA	V_{DS} = 10V, V_{GS} = Ø V	
Differential Gate Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$			25	mV	V_{DS} = 10V, I_D = 100 µA	
Dynamic Electrical Characteristics							
Transconductance	g_m	25	40		mS	V_{DS} = 10V, I_D = – 10 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		30	35	pF	V_{DS} = 10V, I_D = – 10 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		17	20	pF	V_{DS} = 10V, I_D = – 10 mA	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$			2	nV/√Hz	V_{DG} = 3V, I_D = 10 mA	f = 1 kHz

TO-71 Package

Dimensions in Inches (mm)

Pin Configuration

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

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IFN5114, IFN5115, IFN5116

P-Channel Silicon Junction Field-Effect Transistor

- Analog Switches

Absolute maximum ratings at T_A = 25°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 mA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		2		2		2	nA	V_{GS} = 20V, V_{DS} = ØV	
			10		10		10	µA	V_{GS} = 20V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	5	10	3	6	1	4	V	V_{DS} = – 15V, I_G = – 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$		– 1		– 1		– 1	V	V_{DS} = ØV, I_G = – 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 30	– 90					mA	V_{DS} = – 15V, V_{GS} = 18V	
				– 15	– 60	– 5	– 25	mA	V_{DS} = – 15V, V_{GS} = 15V	
Drain Cutoff Current	$I_{D(OFF)}$		– 2		– 2		– 2	nA	V_{DS} = – 15V, V_{GS} = 12V	
			– 10		– 10		– 10	µA	V_{DS} = – 15V, V_{GS} = 7V	T_A = 150°C
Drain Source ON Voltage	$V_{DS(ON)}$		– 1.3					V	V_{GS} = ØV, I_D = – 15 mA	
					– 0.8			V	V_{GS} = ØV, I_D = – 7 mA	
							– 0.6	V	V_{GS} = ØV, I_D = – 3 mA	
Static Drain Source ON Resistance	$r_{DS(ON)}$		75		100		150	Ω	V_{GS} = ØV, I_D = – 1 mA	
Dynamic Electrical Characteristics										
Drain Source ON Resistance	$r_{ds(on)}$		75		100		150	Ω	V_{GS} = ØV, I_D = ØA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		25		25		27	pF	V_{DS} =– 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		7					pF	V_{DS} = – 10V, V_{GS} = 12V	f = 1 MHz
					7			pF	V_{DS} = – 10V, V_{GS} = 7V	f = 1 MHz
							7	pF	V_{DS} = – 10V, V_{GS} = 5V	f = 1 MHz

Switching Characteristics										IFN5114	IFN5115	IFN5116	
Turn ON Delay Time	$t_{d(on)}$		6		10		25	ns	V_{DD}	– 10	– 6	– 6	V
Rise Time	t_r		10		20		35	ns	V_{GG}	20	12	8	V
Turn OFF Delay Time	$t_{d(off)}$		6		8		20	ns	R_L	130	910	2000	Ω
Fall Time	t_f		15		30		60	ns	R_G	100	220	390	Ω
									$I_{D(ON)}$	– 15	– 7	– 3	mA

TO-18 Package
See Section G for Outline Dimensions

Surface Mount
SMP5114, SMP5115, SMP5116

Pin Configuration
1 Source 1, 2 Gate & Case, 3 Drain

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IFN5432, IFN5433, IFN5434

N-Channel Silicon Junction Field-Effect Transistor

- Analog Low On Resistance Switches
- Choppers

Absolute maximum ratings at T_A = 25°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 200		– 200		– 200	pA	V_{GS} = – 15V, V_{DS} = ØV	
			– 200		– 200		– 200	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 3	– 9	– 1	– 4	V	V_{DS} = 5V, I_G = 3 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	150		100		30		mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		200		200		200	pA	V_{DS} = 5V, V_{GS} = – 10V	
			200		200		200	nA	V_{DS} = 5V, V_{GS} = – 10V	T_A = 150°C
Drain Source ON Voltage	V_{DS}		50		70		100	mV	V_{GS} = ØV, I_D = 10 mA	
Static Drain Source ON Resistance	$r_{DS(ON)}$	2	5		7		10	Ω	V_{DS} = ØV, I_D = 10 mA	
Dynamic Electrical Characteristics										
Drain Source ON Resistance	$r_{ds(on)}$		5		7		10	Ω	V_{GS} = ØV, I_D = ØA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		60		60		60	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		20		20		20	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Switching Characteristics										
Turn ON Delay Time	$t_{d(on)}$		4		4		4	ns	V_{DD} = 1.5 V, $V_{GS(ON)}$ = ØV $V_{GS(OFF)}$ = – 12V, $I_{D(ON)}$ = 10 mA **(IFN5432)** R_L = 145 Ω **(IFN5433)** R_L = 143 Ω **(IFN5433)** R_L = 140 Ω	
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

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IFN5564, IFN5565, IFN5566

N-Channel Dual Silicon Junction Field-Effect Transistor

- **Wide Band Differential Amplifier**
- **Commutators**

Absolute maximum ratings at T_A = 25°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 µA, V_{DS} = ØV	
Gate Leakage Voltage	I_{GSS}		– 100		– 100		– 100	pA	V_{GS} = – 20 V, V_{DS} = ØV	
			– 200		– 200		– 200	nA		T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5	– 3	– 0.5	– 3	– 0.5	– 3	V	V_{DS} = 15 V, I_D = 1 nA	
Gate Source Voltage	$V_{GS(f)}$		1		1		1	V	V_{DS} = ØV, I_G = 2 mA	
Saturation Current (Pulsed)	I_{DSS}	5	30	5	30	5	30	mA	V_{DS} = 15 V, V_{GS} = ØV	
Static Drain Source ON Resistance	$rDS_{(ON)}$		100		100		100	Ω	I_D = 1 mA, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	7000	12500	7000	12500	7000	12500	µhmo	V_{DG} = 15 V, I_D = 2 mA	f = 1 kHz
		7000		7000		7000		µhmo		f = 100 MHz
Common Source Output Transconductance	g_{os}		45		45		45	µhmo	V_{DS} = 15 V, I_D = 2 mA	f = 1 kHz
Common Source Input Capacitance	C_{iss}		12		12		12	pF	V_{DS} = 15 V, I_D = 2 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		3		3		3	pF	V_{DS} = 15 V, I_D = 2 mA	f = 1 MHz
Noise Figure	NF		1		1		1	dB	V_{DS} = 15 V, I_D = 2 mA, R_G = 1 MΩ	f = 10 Hz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		50		50		50	nV/√Hz	V_{DG} = 15 V, I_D = 2 mA	f = 10 Hz
Characteristics										
Saturation Drain Current Ratio (Pulsed)	$\frac{I_{DSS1}}{I_{DSS2}}$	0.95	1	0.95	1	0.95	1	– / –	V_{DG} = 15 V, V_{GS} = ØV	
Differential Gate Source Voltage	$\lvert V_{GS(1)} - V_{GS(2)} \rvert$		5		10		20	mV	V_{DS} = 15 V, I_D = 2 mA	
Gate Source Voltage Differential Drift	$\frac{\Delta \lvert V_{GS(f)} - V_{GS(f)} \rvert}{\Delta T}$		10		25		50	µV/°C	V_{DS} = 15 V,	T_A = 25°C T_B = 125°C
			10		25		50	µV/°C	I_D = 2 mA	T_A = 55°C T_B = 25°C
Transconductance Ratio (Pulsed)	$\frac{g_{fs(1)}}{g_{fs(2)}}$	0.95	1	0.9	1	0.9	1	– / –	V_{DS} = 15 V, I_D = 2 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

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IFN5911, IFN5912

N-Channel Dual Silicon Junction Field-Effect Transistor

- VHF Amplifiers
- Wideband Differential Amplifiers

Absolute maximum ratings at T_A = 25°C

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:		IFN5911		IFN5912		Process NJ30L or NJ36D		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	V_{GS} = – 15V, V_{DS} = ØV	
			– 250		– 250	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Operating Current	I_G		– 100		– 100	pA	V_{DG} = 10V, I_D = 5 mA	
			– 100		– 100	nA	V_{DG} = 10V, I_D = 5 mA	T_A = 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1	– 5	– 1	– 5	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Voltage	V_{GS}	– 0.3	– 4	– 0.3	– 4	V	V_{DS} = 10V, I_D = 5 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	7	40	7	40	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transconductance	g_{fs}	3000	10000	3000	10000	µS	V_{DG} = 10V, I_D = 5 mA	f = 1 kHz
		3000	10000	3000	10000	µS	V_{DG} = 10V, I_D = 5 mA	f = 100 MHz
Common Source Output Conductance	g_{os}		100		100	µS	V_{DG} = 10V, I_D = 5 mA	f = 1 kHz
			150		150	µS	V_{DG} = 10V, I_D = 5 mA	f = 100 MHz
Common Source Input Capacitance	C_{iss}		5		5	pF	V_{DG} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	V_{DG} = 10V, I_D = 5 mA	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20	nV/√Hz	V_{DG} = 10V, I_D = 5 mA	f = 10 kHz
Noise Figure	NF		1		1	dB	V_{DG} = 10V, I_D = 5 mA R_G = 100 KΩ	f = 10 Hz
Differential Gate Current	$\lvert I_{G1}\rvert - \lvert I_{G2}\rvert$		20		20	nA	V_{DG} = 10V, I_D = 5 mA	T_A = 125°C
Saturation Drain Current Ratio	I_{DSS1}/I_{DSS2}	0.95	1	0.95	1		V_{DS} = 10V, V_{GS} = ØV	
Differential Gate Source Voltage	$V_{GS1} - V_{GS2}$		10		15	mV	V_{DG} = 10V, I_D = 5 mA	
Gate Source Voltage Differential Drift	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		20		40	µV/°C	V_{DG} = 10V, I_D = 5 mA	T_A = 25°C T_B = 125°C
	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		20		40	µV/°C	V_{DG} = 10V, I_D = 5 mA	T_A = – 55°C T_B = 25°C
Transconductance Ratio	g_{fs1}/g_{fs2}	0.95	1	0.95	1		V_{DG} = 10V, I_D = 5 mA	f = 1 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

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IFN6449, IFN6450

N-Channel Silicon Junction Field-Effect Transistor

- High Voltage

Absolute maximum ratings at T_A = 25°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:		IFN6449		IFN6450		Process NJ42		
Static Electrical Characteristics		Min	Max	Min	Max	Unit	Test Conditions	
Gate Drain Breakdown Voltage	$V_{(BR)GDO}$	– 300		– 200		V	I_G = – 10 µA, I_S = ØA	
Gate Source Breakdown Voltage	$V_{(BR)GSO}$	– 100		– 100		V	I_G = – 10 µA, I_D = ØA	
Gate Reverse Current	I_{GSS}				– 100	nA	V_{GS} = – 80V, V_{DS} = ØV	
					– 100	µA	V_{GS} = – 80V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2	– 15	– 2	– 15	V	V_{DS} = 30V, I_D = 4 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	2	10	2	10	mA	V_{DS} = 30V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transfer Transmittance	$\lvert Y_{fs} \rvert$	0.5	3	0.5	3	mS	V_{DS} = 30V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		100		100	µS	V_{DS} = 30V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		10		10	pF	V_{DS} = 30V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		5		5	pF	V_{DS} = 30V, V_{GS} = ØV	f = 1 MHz

TO-39 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate & Case

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J108, J109

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at T_A = 25°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:		J108		J109		Process NJ450		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 3		– 3	nA	V_{GS} = – 15V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 3	– 10	– 2	– 6	V	V_{DS} = 5V, I_D = 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	80		40		mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		3		3	nA	V_{DS} = 5V, V_{GS} = – 10V	
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$		8		12	Ω	V_{GS} = Ø, V_{DS} < = 0.1V	f = 1 kHz
Drain Gate Capacitance	C_{gd}		15		15	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Source Gate Capacitance	C_{gs}		15		15	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Drain Gate + Source Gate Capacitance	C_{gd} + C_{gs}		85		85	pF	V_{DS} = V_{GS} = ØV	f = 1 MHz
Switching Characteristics		**Typ**		**Typ**				
Turn ON Delay Time	$td_{(on)}$	3		3		ns		
Rise Time	t_r	1		1		ns		
Turn OFF Delay Time	$td_{(off)}$	4		4		ns		
Fall Time	t_f	18		18		ns		

	J108	**J109**	
V_{DD}	1.5	1.5	V
$V_{GS(OFF)}$	– 12	– 7	V
R_L	150	150	Ω

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ108, SMPJ109

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J110, J110A

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at T_A = 25°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:		J110		J110A		Process NJ450		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 3		– 3	nA	V_{GS} = – 15V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5	– 4	– 0.5	– 4	V	V_{DS} = 5V, I_D = 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	10		10		mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		3		3	nA	V_{DS} = 5V, V_{GS} = – 10V	
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$		18		25	Ω	V_{GS} = Ø, V_{DS} < = 0.1V	f = 1 kHz
Drain Gate Capacitance	C_{gd}		15		15	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Source Gate Capacitance	C_{gs}		15		15	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Drain Gate + Source Gate Capacitance	C_{gd} + C_{gs}		85		85	pF	V_{DS} = V_{GS} = ØV	f = 1 MHz

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

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°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 1		– 1		– 1	nA	V_{GS} = – 15V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 3	– 10	– 1	– 5		– 3	V	V_{DS} = 5V, I_D = 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	20		5		2		mA	V_{DS} = 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		– 1		– 1		– 1	nA	V_{DS} = 15V, V_{GS} = – 10V	
Dynamic Electrical Characteristics										
Drain Source ON Resistance	$r_{ds(on)}$		30		50		100	Ω	V_{GS} = ØV, V_{DS} = 0.1V	f = 1 kHz
Drain Gate Capacitance	C_{dg}		5		5		5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Source Gate Capacitance	C_{gs}		5		5		5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Drain Gate + Source Gate Capacitance	C_{gd} + C_{gs}		28		28		28	pF	V_{DS} = V_{GS} = ØV	f = 1 MHz

Switching Characteristics		Typ	Typ	Typ			J111	J112	J113	
Turn ON Delay Time	$t_{d(on)}$	7	7	7	ns					
Rise Time	t_r	6	6	2	ns	V_{DD}	10	10	10	V
Turn OFF Delay Time	$t_{d(off)}$	20	20	20	ns	$V_{GS(OFF)}$	– 12	– 7	– 5	V
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

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J174, J175

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

Absolute maximum ratings at T_A = 25°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:		J174		J175		Process PJ99		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		V	I_G = 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		1		1	nA	V_{GS} = 20V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	5	10	3	6	V	V_{DS} = – 15V, I_D = – 10 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 20	– 125	– 7	– 70	mA	V_{DS} = – 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		– 1		– 1	nA	V_{DS} = – 15V, V_{GS} = 10V	
Dynamic Electrical Characteristics			**Max**		**Max**			
Drain Source ON Resistance	$r_{ds(on)}$		85		85	Ω	V_{GS} = Ø, V_{DS} < = 0.1V	f = 1 kHz
Dynamic Electrical Characteristics			**Typ**		**Typ**			
Drain Gate Capacitance	C_{gd}		5.5		5.5	pF	V_{DS} = ØV, V_{GS} = 10V	f = 1 MHz
Source Gate Capacitance	C_{gs}		5.5		5.5	pF	V_{DS} = ØV, V_{GS} = 10V	f = 1 MHz
Drain Gate + Source Gate Capacitance	C_{gd} + C_{gs}		32		32	pF	V_{DS} = V_{GS} = ØV	f = 1 MHz
Switching Characteristics								
Turn ON Delay Time	$td_{(on)}$		2		5	ns		
Rise Time	t_r		5		10	ns		
Turn OFF Delay Time	$td_{(off)}$		5		10	ns		
Fall Time	t_f		10		20	ns		

	J174	J175	
V_{DD}	– 10	– 6	V
$V_{GS(OFF)}$	12	8	V
R_L	560	1.2 k	Ω
$V_{GS(ON)}$	Ø	Ø	V

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°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:		J176		J177		Process PJ99		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		V	I_G = 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		1		1	nA	V_{GS} = 20V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	1	4	0.8	2.25	V	V_{DS} = – 15V, I_D = – 10 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	– 2	– 35	– 1.5	– 20	mA	V_{DS} = – 15V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		– 1		– 1	nA	V_{DS} = – 15V, V_{GS} = 10V	
Dynamic Electrical Characteristics			**Max**		**Max**			
Drain Source ON Resistance	$r_{ds(on)}$		250		300	Ω	V_{GS} = Ø, V_{DS} < = 0.1V	f = 1 kHz
Dynamic Electrical Characteristics			**Typ**		**Typ**			
Drain Gate Capacitance	C_{gd}		5.5		5.5	pF	V_{DS} = ØV, V_{GS} = 10V	f = 1 MHz
Source Gate Capacitance	C_{gs}		5.5		5.5	pF	V_{DS} = ØV, V_{GS} = 10V	f = 1 MHz
Drain Gate + Source Gate Capacitance	C_{gd} + C_{gs}		32		32	pF	V_{DS} = V_{GS} = ØV	f = 1 MHz
Switching Characteristics								
Turn ON Delay Time	$td_{(on)}$		15		20	ns		
Rise Time	t_r		20		25	ns		
Turn OFF Delay Time	$td_{(off)}$		15		20	ns		
Fall Time	t_f		20		25	ns		

	J176	J177	
V_{DD}	– 6	– 6	V
$V_{GS(OFF)}$	6	3	V
R_L	5.6 k	10 k	Ω
$V_{GS(ON)}$	Ø	Ø	V

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Gate, 3 Source

Surface Mount
SMPJ176, SMPJ177

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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°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	V_{GS} = – 20V, V_{DS} = ØV	
Gate Operating Current	I_G		– 10			– 10		pA	V_{DG} = 20V, I_D = $I_{DSS(min)}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.3		– 1.5	– 0.8		– 4	V	V_{DS} = 20V, I_D = 10 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.2		1	0.9		4.5	mA	V_{DSS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	500			1000			µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		1			3.5		µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4			4		pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5			5		nV/√Hz	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ201, SMPJ202

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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°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:		J203			J204			Process NJ16		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40			– 25			V	I_G = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	V_{GS} = – 20V, V_{DS} = ØV	
Gate Operating Current	I_G		– 10			– 10		pA	V_{DG} = 20V, I_D = $I_{DSS(min)}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2		– 10	– 0.3		– 2	V	V_{DS} = 20V, I_D = 10 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	4		20	0.2	1.2	3	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	1500			500	1500		µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		10			2.5		µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4			4		pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		5			10		nV/√Hz	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ203, SMPJ204

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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°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	V_{GS} = – 15V, V_{DS} = ØV	
Gate Operating Current	I_G		– 10			– 10		pA	V_{DS} = 20V, I_D = 1 mA	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 3	– 2.5		– 4.5	V	V_{DS} = 15V, I_D = 1 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	2		15	7		20	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	4000		12000	6000		12000	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}			150			200	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4			4		pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/√Hz	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ210, SMPJ211

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J212

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifier
- General Purpose Amplifier

Absolute maximum ratings at T_A = 25°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:		J212			Process NJ26L		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 100	pA	V_{GS} = – 15V, V_{DS} = ØV	
Gate Operating Current	I_G		– 10		pA	V_{DS} = 20V, I_D = 1 mA	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4		– 6	V	V_{DS} = 15V, I_D = 1 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	15		40	mA	V_{DS} = 15V, V_{GS} = Ø V	
Dynamic Electrical Characteristics							
Common Source Forward Transconductance	g_{fs}	7000		12000	µS	V_{DS} = 15V, V_{GS} = Ø V	f = 1 kHz
Common Source Output Conductance	g_{os}			200	µS	V_{DS} = 15V, V_{GS} = Ø V	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4		pF	V_{DS} = 15V, V_{GS} = Ø V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1		pF	V_{DS} = 15V, V_{GS} = Ø V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10		nV/√Hz	V_{DS} = 15V, V_{GS} = Ø V	f = 1 kHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ212

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J230, J231

N-Channel Silicon Junction Field-Effect Transistor

- Audio Amplifiers

Absolute maximum ratings at T_A = 25°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 250			– 250	pA	V_{GS} = – 30V, V_{DS} = ØV	
Gate Operating Current	I_G		– 2			– 2		pA	V_{DS} = 20V, I_D = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 0.5		– 3	– 1.5		– 5	V	V_{DS} = 20V, I_D = 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	0.7		3	2		6	mA	V_{DS} = 20V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	1000		3500	1500		4000	µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Output Conductance	g_{os}		1.5			3		µS	V_{DS} = 20V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4			4		pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1			1		pF	V_{DS} = 20V, V_{GS} = ØV	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		8	30		8	30	nV/√Hz	V_{DS} = 10V, V_{GS} = ØV	f = 10 Hz
			2			2		nV/√Hz	V_{DS} = 10V, V_{GS} = ØV	f = 1 kHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ230, SMPJ231

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J232

N-Channel Silicon Junction Field-Effect Transistor

- **Audio Amplifier**

Absolute maximum ratings at T_A = 25 °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:		J232			Process NJ16		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 40			V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 250	pA	V_{GS} = – 30V, V_{DS} = ØV	
Gate Operating Current	I_G		– 2		pA	V_{DS} = 20V, I_D = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 3		– 6	V	V_{DS} = 20V, I_D = 1 µA	
Drain Saturation Current (Pulsed)	I_{DSS}	5		10	mA	V_{DS} = 20V, V_{GS} = Ø V	
Dynamic Electrical Characteristics							
Common Source Forward Transconductance	g_{fs}	2500		5000	µS	V_{DS} = 20V, V_{GS} = Ø V	f = 1 kHz
Common Source Output Conductance	g_{os}		5		µS	V_{DS} = 20V, V_{GS} = Ø V	f = 1 kHz
Common Source Input Capacitance	C_{iss}		4		pF	V_{DS} = 20V, V_{GS} = Ø V	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1		pF	V_{DS} = 20V, V_{GS} = Ø V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20	30	nV/√Hz	V_{DS} = 10V, V_{GS} = Ø V	f = 10 Hz
			6		nV/√Hz	V_{DS} = 10V, V_{GS} = Ø V	f = 1 kHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ232

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J304, J305

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- Oscillators
- VHF/UHF Amplifiers

Absolute maximum ratings at T_A = 25°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 100			– 100	pA	V_{GS} = – 20V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2		– 6	– 0.5		– 3	V	V_{DS} = 15V, I_D = 1 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	5		15	1		8	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	4500		7500	3000			µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
						3000		µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			4200					µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Output Conductance	g_{os}			50			50	µS	V_{DS} = 15V, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		3			3		pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		0.85			0.85		pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Output Capacitance	C_{oss}		1			1		pF	V_{DS} = 15V, V_{GS} = ØV	f = 1 MHz
Common Source Output Conductance	g_{os}		60			60		µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			80					µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Output Susceptance	b_{os}		800			800		µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			3600					µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Input Conductance	g_{is}		80			80		µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			800					µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Input Susceptance	b_{is}		2000			2000		µS	V_{DS} = 15V, V_{GS} = ØV	f = 100 MHz
			7500					µS	V_{DS} = 15V, V_{GS} = ØV	f = 400 MHz
Common Source Power Gain	G_{ps}		20					dB	V_{DS} = 15V, I_D = 5 mA	f = 100 MHz
			11					dB	V_{DS} = 15V, I_D = 5 mA	f = 400 MHz
Noise Figure	NF		1.7					dB	V_{DS} = 15V, I_D = 5 mA R_G = 1 Ω	f = 100 MHz
			3.8					dB		f = 400 MHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ304, SMPJ305

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J308, J309

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- Oscillators
- VHF/UHF Amplifiers

Absolute maximum ratings at T_A = 25°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 1			– 1	nA	V_{GS} = – 15V, V_{DS} = ØV	
				– 1			– 1	µA	V_{GS} = – 15V, V_{DS} = ØV	T_A = +125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 6.5	– 1		– 4	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$			1			1	V	V_{DS} = ØV, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	12		60	12		30	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	g_{fs}	8000	17000		10000	17000		µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Source Output Conductance	g_{os}			250			250	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Gate Forward Transconductance	g_{fg}		13000			13000		µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Gate Output Transconductance	g_{og}		150			100		µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Gate Drain Capacitance	C_{dg}		1.8	2.5		1.8	2.5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Gate Source Capacitance	C_{gs}		4	5		4	5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/√Hz	V_{DS} = 10V, I_D = 10 mA	f = 100 kHz
Common Source Forward Transconductance	$Re_{(Yfs)}$		12			12		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Gate Input Conductance	$Re_{(Yig)}$		14			14		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Source Input Conductance	$Re_{(Yis)}$		0.4			0.4		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Source Output Conductance	$Re_{(Gos)}$		0.15			0.15		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Gate Power Gain at Noise Match	G_{pg}		16			16		dB	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			11			11		dB	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Noise Figure	NF		1.5			1.5		dB	V_{DS} = 15V, I_D = 10 mA	f = 105 MHz
			2.7			2.7		dB	V_{DS} = 15V, I_D = 10 mA	f = 450 MHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ308, SMPJ309

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J310

N-Channel Silicon Junction Field-Effect Transistor

- Mixer
- Oscillator
- VHF/UHF Amplifier

Absolute maximum ratings at T_A = 25°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:		J310			Process NJ72		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 1	nA	V_{GS} = – 15V, V_{DS} = ØV	
				– 1	µA	V_{GS} = – 15V, V_{DS} = ØV	T_A = + 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2		– 6.5	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	V_{DS} = ØV, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	24		60	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics							
Common Source Forward Transconductance	g_{fs}	8000	17000		µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Source Output Conductance	g_{os}			250	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Gate Forward Transconductance	g_{fg}		1200		µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Gate Output Transconductance	g_{og}		150		µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Gate Drain Capacitance	C_{dg}		1.8	2.5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Gate Source Capacitance	C_{gs}		4	5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10		nV/√Hz	V_{DS} = 10V, I_D = 10 mA	f = 100 Hz
Common Source Forward Transconductance	Re (Y_{fs})		12		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Gate Input Conductance	Re (Y_{ig})		14		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Source Input Conductance	Re (Y_{is})		0.4		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Source Output Conductance	Re (g_{os})		0.15		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
Common Gate Power Gain at Noise Match	G_{pg}		16		dB	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			11		dB	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Noise Figure	NF		1.5		dB	V_{DS} = 15V, I_D = 10 mA	f = 105 MHz
			2.7		dB	V_{DS} = 15V, I_D = 10 mA	f = 450 MHz

TO-226AA Package
Dimensions in Inches (mm)

Pin Configuration
1 Drain, 2 Source, 3 Gate

Surface Mount
SMPJ310

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P1086, P1087

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Analog Switches

Absolute maximum ratings at T_A = 25°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:		P1086		P1087		Process PJ99		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		V	I_G = 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		2		2	nA	V_{GS} = 15V, V_{DS} = ØV	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$		10		5	V	V_{DS} = – 15V, I_D = – 1 µA	
Saturation Drain Current (Pulsed)	I_{DSS}	– 10		– 5.0		mA	V_{DS} = – 20V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		– 10		– 10	nA	V_{DS} = – 15V, V_{GS} = 12V (P1086)	
			– 0.5		– 0.5	µA	V_{GS} = 7V (P1087)	T_A = 85°C
Drain Reverse Current	I_{DGO}		2		2	nA	V_{DG} = – 15V, I_S = ØA	
			0.1		0.1	µA	V_{DG} = – 15V, I_S = ØA	T_A = 85°C
Drain Source ON Voltage	$V_{DS(ON)}$		– 0.5		– 0.5	V	V_{GS} = ØV, I_D = – 6 mA (P1086)	
			– 0.5		– 0.5	V	V_{GS} = ØV, I_D = – 3 mA (P1087)	
Static Drain Source ON Resistance	$r_{DS(ON)}$		75		150	Ω	I_D = – 1 mA, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$		75		150	Ω	I_D = Ø, V_{GS} = ØV	f = 1 kHz
Common Source Input Capacitance	C_{iss}		45		45	pF	V_{DS} = – 15V, V_{GS} = ØV	f = 1 kHz
Common Source Reverse Transfer Capacitance	C_{rss}		10		10	pF	V_{DS} = ØV, V_{GS} = 12V (P1086)	f = 1 MHz
			10		10	pF	V_{DS} = ØV, V_{GS} = 7V (P1087)	
Switching Characteristics								
Turn ON Delay Time	$td_{(on)}$		15		15	ns	V_{DD} = – 6V, $V_{GS(ON)}$ = ØV	
Rise Time	t_r		20		75	ns		
Turn OFF Delay Time	$td_{(off)}$		15		25	ns		
Fall Time	t_f		50		100	ns		

	P1086	P1087	
$V_{GS(OFF)}$	12	7	V
$V_{D(ON)}$	– 6	– 3	MA
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

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SMP5911, SMP5912

Dual N-Channel Silicon Junction Field-Effect Transistor

- **Wideband Differential Amplifiers**

At 25°C free air temperature:		SMP5911		SMP5912		Process NJ30L		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25		– 25		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 100		– 100	pA	V_{GS} = – 15V, V_{DS} = ØV	
			– 250		– 250	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Operating Current	I_G		– 100		– 100	pA	V_{DG} = 10V, I_D = 5 mA	
			– 100		– 100	nA	V_{DG} = 10V, I_D = 5 mA	T_A = 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1.0	– 5	– 1.0	– 5	V	V_{DS} = 15V, I_D = 5 nA	
Gate Source Voltage	V_{GS}	– 0.3	– 4	– 0.3	– 4	V	V_{DS} = 15V, I_D = 5 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	7	40	7	40	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics								
Common Source Forward Transconductance	g_{fs}	3000	10000	3000	10000	µS	V_{DG} = 10V, I_D = 5 mA	f = 1 kHz
		3000	10000	3000	10000	µS	V_{DG} = 10V, I_D = 5 mA	f = 100 MHz
Common Source Output Conductance	g_{os}		100		100	µS	V_{DG} = 10V, I_D = 5 mA	f = 1 kHz
			150		150	µS	V_{DG} = 10V, I_D = 5 mA	f = 100 MHz
Common Source Input Capacitance	C_{iss}		5		5	pF	V_{DG} = 10V, I_D = 5 mA	f = 1 MHz
Common Source Reverse Transfer Capacitance	C_{rss}		1.2		1.2	pF	V_{DG} = 10V, I_D = 5 mA	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		20		20	nV/√Hz	V_{DG} = 10V, I_D = 5 mA	f = 10 kHz
Noise Figure	NF		1		1	dB	V_{DG} = 10V, I_D = 5 mA R_G = 100 KΩ	f = 10 kHz
Gate Source Differential Voltage	$V_{GS1} - V_{GS2}$		10		15	mV	V_{DG} = 10V, I_D = 5 mA	
Gate Differential Current	$I_{G1} - I_{G2}$		20		20	nA	V_{DG} = 10V, I_D = 5 mA	T_A = 125°C
Drain Saturation Current Ratio	I_{DSS1} / I_{DSS2}	0.95	1	0.95	1		V_{DG} = 10V, V_{GS} = ØV	
Transconductance Ratio	g_{fs1} / g_{fs2}	0.95	1	0.95	1		V_{DG} = 10V, I_D = 5 mA	f = 1 kHz
Gate Source Differential Voltage With Temperature	$\frac{\Delta V_{GS1} - V_{GS2}}{\Delta T}$		20		40	µV/°C	V_{DG} = 10V, I_D = 5 mA	T_A = 25°C
			20		40	µV/°C	V_{DG} = 10V, I_D = 5 mA	T_B = 125°C
			20		40	µV/°C	V_{DG} = 10V, I_D = 5 mA	T_A = 35°C
			20		40	µV/°C	V_{DG} = 10V, I_D = 5 mA	T_B = 25°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°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:		U290		U291		Process NJ1800D		
Static Electrical Characteristics		**Min**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 30		– 30		V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}		– 1		– 1	nA	V_{GS} = – 15V, V_{DS} = ØA	
			– 1		– 1	µA	V_{GS} = – 15V, V_{DS} = ØA	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 4	– 10	– 1.5	– 4.5	V	V_{DS} = 15V, I_D = 3 nA	
Drain Saturation Current (Pulsed)	I_{DSS}	500		200		mA	V_{DS} = 10V, V_{GS} = ØV	
Drain Cutoff Current	$I_{D(OFF)}$		1		1	nA	V_{DS} = 5V, V_{GS} = – 10V	
			1		1	µA	V_{DS} = 5V, V_{GS} = – 10V	T_A = 150°C
Drain Source ON Voltage	$V_{DS(ON)}$		30		70	mV	V_{GS} = ØV, I_D = 10 mA	
Static Drain Source ON Resistance	$r_{DS(ON)}$	1	3	2	7	Ω	V_{GS} = ØV, I_D = 10 mA	
Dynamic Electrical Characteristics								
Drain Source ON Resistance	$r_{ds(on)}$	1	3	2	7	Ω	V_{GS} = ØV, I_D = Ø	f = 1 kHz
Drain Gate OFF Capacitance	C_{dgo}		30		30	pF	V_{DG} = 15V, I_S = ØV	f = 1 MHz
Source Gate OFF Capacitance	C_{sgo}		30		30	pF	V_{DG} = 15V, I_S = ØV	f = 1 MHz
Source Gate Plus Drain Gate	C_{iss}		160		160	pF	V_{DG} = ØV, V_{GS} = ØV	f = 1 MHz
Switching Characteristics								
Turn ON Delay Time	$td_{(on)}$		15		15	ns	V_{DD} = 1.5V, $I_{D(ON)}$ = 30 mA R_L = 50Ω $V_{GS(ON)}$ = ØV **(U290)** $V_{GS(OFF)}$ = – 12V **(U291)** $V_{GS(OFF)}$ = – 7V	
Rise Time	t_r		20		20	ns		
Turn OFF Delay Time	$td_{(off)}$		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

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U308, U309

N-Channel Silicon Junction Field-Effect Transistor

- Mixers
- Oscillators
- VHF/UHF Amplifiers

Absolute maximum ratings at T_A = 25°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} = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 150			– 150	pA	V_{GS} = – 15V, V_{DS} = ØV	
				– 150			– 150	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = +125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 6	– 1		– 4	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$			1			1	V	V_{DS} = ØV, I_G = 10 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	12		60	12		30	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Gate Forward Transconductance	G_{fs}	10	17		10	17		mS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
			15			15		mS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			14			14		mS	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Common Gate Output Conductance	G_{og}			250			250	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
			0.18			0.18		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			0.32			0.32		µS	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Drain Gate Capacitance	C_{dg}			2.5			2.5	pF	V_{DS} = 10V, V_{GS} = – 10V	f = 1 MHz
Gate Source Capacitance	C_{gs}			5		5		pF	V_{DS} = 10V, V_{GS} = – 10V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/√Hz	V_{DS} = 10V, I_D = 10 mA	f = 100 kHz
Common Gate Power Gain	G_{pg}	14	16		14	16		dB	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
		10	11		10	11		dB	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Noise Figure	NF		1.5	2		1.5	2	dB	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			2.7	3.5		2.7	3.5	dB	V_{DS} = 10V, I_D = 10 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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U310

N-Channel Silicon Junction Field-Effect Transistor

- Mixer
- Oscillator
- VHF/UHF Amplifier

Absolute maximum ratings at T_A = 25°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:		U310			Process NJ72L		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 150	pA	V_{GS} = – 15V, V_{DS} = ØV	
				– 150	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2.5		– 6	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	V_{DS} = ØV, I_G = 10 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	24		60	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics							
Common Gate Forward Transconductance		10	17		mS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
	g_{fg}		15		mS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			14		mS	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Common Gate Output Conductance				250	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
	g_{og}		0.18		µS	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			0.32		µS	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Drain Gate Capacitance	C_{dg}			2.5	pF	V_{DS} = 10V, V_{GS} = – 10V	f = 1 MHz
Gate Source Capacitance	C_{gs}			5	pF	V_{DS} = 10V, V_{GS} = – 10V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10		nV/√Hz	V_{DS} = 10V, I_D = 10 mA	f = 100 Hz
Common Gate Power Gain	G_{pg}	14	16		dB	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
		10	11		dB	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz
Noise Figure	NF		1.5	2	dB	V_{DS} = 10V, I_D = 10 mA	f = 105 MHz
			2.7	3.5	dB	V_{DS} = 10V, I_D = 10 mA	f = 450 MHz

TO-52 Package
See Section G for Outline Dimensions

Surface Mount
SMPJ310

Pin Configuration
1 Source, 2 Drain, 3 Gate & Case

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U311

N-Channel Silicon Junction Field-Effect Transistor

- Mixer
- Oscillator
- VHF/UHF Amplifier

Absolute maximum ratings at T_A = 25°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:		U311			Process NJ72L		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 150	pA	V_{GS} = – 15V, V_{DS} = ØV	
				– 150	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 6	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	V_{DS} = ØV, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	20		60	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics							
Common Gate Forward Transconductance	g_{fg}	1000	17000		µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Gate Output Conductance	g_{og}			250	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Gate Drain Capacitance	C_{dg}			2.5	pF	V_{DS} = 10V, I_D = 10 mA	f = 1 MHz
Gate Source Capacitance	C_{gs}			5	pF	V_{DS} = 10V, I_D = 10 mA	f = 1 MHz

TO-72 Package
Dimensions in Inches (mm)

Pin Configuration
1 Source, 2 Drain, 3 Gate, 4 Case

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U350

Hybrid Quad Silicon Junction Field-Effect Transistor Array

- Analog Multiplier
- VHF Double-Balanced Mixer

Absolute maximum ratings at T_A = 25°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:		U350			Four Matched Process NJ72L		
Static Electrical Characteristics		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	– 25			V	I_G = – 1 µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 1	nA	V_{GS} = – 15V, V_{DS} = ØV	
				– 1	µA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 125°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 2		– 6	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$			1	V	V_{DS} = ØV, I_G = 1 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	24		60	mA	V_{DS} = 15V, V_{GS} = ØV	
Dynamic Electrical Characteristics							
Drain Source ON Resistance	$r_{ds(on)}$		50	90	Ω	V_{GS} = ØV, I_D = mA	f = 1 kHz
Common Source Forward Transconductance	g_{fs}	10		18	mS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Common Source Output Conductance	g_{os}			150	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
Drain Gate Capacitance	C_{dgo}			2.5	pF	V_{GD} = – 10V, I_S = ØV	f = 1 MHz
Gate Source Capacitance	C_{sgo}			5	pF	V_{GS} = – 10V, I_D = ØV	f = 1 MHz
(Conversion Gain)	G_c		4		dB	V_{DS} = 20V, V_{GS} = 1/2 $V_{GS(OFF)}$ R_D = 1,700 Ω	f = 100 MHz
Noise Figure	NF		7		dB	V_{DS} = 20V, V_{GS} = 1/2 $V_{GS(OFF)}$ R_D = 1,700 Ω	f = 100 MHz
Saturation Drain Current Ratio	I_{DSS} / I_{DSS}	0.9		1		V_{DS} = 15V, V_{DS} = ØV	
Gate Source Cutoff Voltage Ratio	$V_{GS(OFF)}$ / $V_{GS(OFF)}$	0.9		1		V_{DS} = 15V, I_D = 1 nA	
Common Source Forward Transconductance	g_{fs} / g_{fs}	0.9		1		V_{DS} = 15V, I_D = 10 mA	f = 1 kHz
Differential Output Conductance	Y_{os} / Y_{os}	0.9		1		V_{DS} = 15V, I_D = 10 mA	f = 1 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°C.

Total Device Dissipation (Derate 4 mW/°C to150°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 = – 1µA, V_{DS} = ØV	
Gate Reverse Current	I_{GSS}			– 150			– 150	pA	V_{GS} = – 15V, V_{DS} = ØV	
				– 150			– 150	nA	V_{GS} = – 15V, V_{DS} = ØV	T_A = 150°C
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	– 1		– 4	– 2		– 6	V	V_{DS} = 10V, I_D = 1 nA	
Gate Source Forward Voltage	$V_{GS(F)}$			1			1	V	V_{DS} = ØV, I_G = 10 mA	
Drain Saturation Current (Pulsed)	I_{DSS}	12		30	24		60	mA	V_{DS} = 10V, V_{GS} = ØV	
Dynamic Electrical Characteristics										
Common Source Forward Transconductance	G_{fs}	10	17		10	17		mS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
			12			12		mS	V_{DS} = 10V, I_D = 10 mA	f = 100 MHz
Common Source Output Conductance	G_{os}			250			250	µS	V_{DS} = 10V, I_D = 10 mA	f = 1 kHz
			0.15			0.15		µS	V_{DS} = 10V, I_D = 10 mA	f = 100 MHz
Drain Gate Capacitance	C_{dg}			5			5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Source Gate Capacitance	C_{gs}			2.5			2.5	pF	V_{DS} = ØV, V_{GS} = – 10V	f = 1 MHz
Equivalent Short Circuit Input Noise Voltage	$\bar{e}_N$		10			10		nV/√Hz	V_{DS} = 10V, I_D = 10 mA	f = 100 kHz
Power Match Source Admittance	g_{ig}		12			12			V_{DS} = 10V, I_D = 10 mA	f = 100 MHz
Conversion Gain	G_c		3			3		dB	V_{DS} = 20V, R_L = 2 kΩ V_{GS} = 1/2 $V_{GS(OFF)}$	f = 100 MHz
Saturation Drain Current Ratio	I_{DSS1}/I_{DSS2}	0.9		1	0.9		1		V_{DS} = 10V, V_G = ØV	
Gate Source Cutoff Voltage Ratio	$\frac{V_{GS(OFF)1}}{V_{GS(OFF)2}}$	0.9		1	0.9		1		V_{DS} = 10V, I_D = 1 nA	
Transconductance Ratio	g_{fs1}/g_{fs2}	0.9		1	0.9		1		V_{DS} = 10V, I_D = 10 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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