

2N4391, 2N4392, 2N4393

N-Channel Silicon Junction Field-Effect Transistor

- Low On Resistance Analog Switches
- Choppers
- Commutators

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

Reverse Gate Source & Reverse Gate Drain Voltage	- 40 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	1.8 W
Power Derating	12 mW/°C

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

Dynamic Electrical Characteristics

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

Switching Characteristics

Turn ON Delay Time	$t_{d(on)}$		15		15		15	ns	$V_{DD} = 10\text{V}, V_{GS(ON)} = \emptyset\text{V}$
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
$V_{GS(OFF)}$	- 12	- 7	- 5

TO-18 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMP4391, SMP4392, SMP4393



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

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

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

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

At 25°C free air temperature:

Static Electrical Characteristics

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

Dynamic Electrical Characteristics

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

Switching Characteristics

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

TO-18 Package

See Section G for Outline Dimensions

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

Surface Mount

SMP4856, SMP4857, SMP4858,
SMP4859, SMP4860, SMP4861



IFN5432, IFN5433, IFN5434

N-Channel Silicon Junction Field-Effect Transistor

- Analog Low On Resistance Switches
- Choppers

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

Reverse Gate Source & Reverse Gate Drain Voltage	- 25 V
Continuous Forward Gate Current	100 mA
Continuous Device Power Dissipation	300 mW
Power Derating	2.4 mW/°C

At 25°C free air temperature:
Static Electrical Characteristics

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

Dynamic Electrical Characteristics

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

Switching Characteristics

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

TO-52 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source, 2 Drain, 3 Gate & Case

J108, J109

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

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

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

At 25°C free air temperature:

Static Electrical Characteristics

		J108		J109		Unit	Process NJ450	
		Min	Max	Min	Max		Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	- 25		- 25		V	$I_G = - 1 \mu\text{A}, V_{DS} = 0\text{V}$	
Gate Reverse Current	I_{GSS}		- 3		- 3	nA	$V_{GS} = - 15\text{V}, V_{DS} = 0\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	- 3	- 10	- 2	- 6	V	$V_{DS} = 5\text{V}, I_D = 1 \mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	80		40		mA	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		3		3	nA	$V_{DS} = 5\text{V}, V_{GS} = - 10\text{V}$	

Dynamic Electrical Characteristics

Drain Source ON Resistance	$r_{ds(on)}$		8		12	Ω	$V_{GS} = 0, V_{DS} < = 0.1\text{V}$	$f = 1 \text{ kHz}$
Drain Gate Capacitance	C_{gd}		15		15	pF	$V_{DS} = 0\text{V}, V_{GS} = - 10\text{V}$	$f = 1 \text{ MHz}$
Source Gate Capacitance	C_{gs}		15		15	pF	$V_{DS} = 0\text{V}, V_{GS} = - 10\text{V}$	$f = 1 \text{ MHz}$
Drain Gate + Source Gate Capacitance	$C_{gd} + C_{gs}$		85		85	pF	$V_{DS} = V_{GS} = 0\text{V}$	$f = 1 \text{ MHz}$

Switching Characteristics

		Typ		Unit				
		Typ	Typ		J108	J109		
Turn ON Delay Time	$t_{d(on)}$	3	3	ns	V_{DD}	1.5	1.5	V
Rise Time	t_r	1	1	ns	$V_{GS(OFF)}$	- 12	- 7	V
Turn OFF Delay Time	$t_{d(off)}$	4	4	ns	R_L	150	150	Ω
Fall Time	t_f	18	18	ns				

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ108, SMPJ109



J110, J110A

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

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

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

At 25°C free air temperature:

Static Electrical Characteristics

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

Dynamic Electrical Characteristics

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

Switching Characteristics

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

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Source, 3 Gate

Surface Mount

SMPJ110, SMPJ110A



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J111, J112, J113

N-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

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

Reverse Gate Source & Reverse Gate Drain Voltage	- 35 V
Continuous Forward Gate Current	50 mA
Continuous Device Power Dissipation	360 mW
Power Derating	3.27 mW/°C

At 25°C free air temperature Static Electrical Characteristics		J111		J112		J113		Process NJ132		
		Min	Max	Min	Max	Min	Max	Unit	Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	- 35		- 35		- 35		V	$I_G = - 1\mu\text{A}, V_{DS} = 0\text{V}$	
Gate Reverse Current	I_{GSS}		- 1		- 1		- 1	nA	$V_{GS} = - 15\text{V}, V_{DS} = 0\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	- 3	- 10	- 1	- 5		- 3	V	$V_{DS} = 5\text{V}, I_D = 1\mu\text{A}$	
Drain Saturation Current (Pulsed)	I_{DSS}	20		5		2		mA	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		- 1		- 1		- 1	nA	$V_{DS} = 15\text{V}, V_{GS} = - 10\text{V}$	

Dynamic Electrical Characteristics

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

Switching Characteristics

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



2N5020, 2N5021

P-Channel Silicon Junction Field-Effect Transistor

• Analog Switches

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

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

At 25°C free air temperature:

Static Electrical Characteristics

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

Dynamic Electrical Characteristics

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

TO-18 Package

Dimensions in Inches (mm)

Pin Configuration

1 Source 1, 2 Gate & Case, 3 Drain

Surface Mount

SMP5020, SMP5021



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J174, J175

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

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

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

At 25°C free air temperature:

Static Electrical Characteristics

		J174		J175		Unit	Process PJ99	
		Min	Max	Min	Max		Test Conditions	
Gate Source Breakdown Voltage	$V_{(BR)GSS}$	30		30		V	$I_G = 1\ \mu\text{A}, V_{DS} = 0\text{V}$	
Gate Reverse Current	I_{GSS}		1		1	nA	$V_{GS} = 20\text{V}, V_{DS} = 0\text{V}$	
Gate Source Cutoff Voltage	$V_{GS(OFF)}$	5	10	3	6	V	$V_{DS} = -15\text{V}, I_D = -10\ \text{nA}$	
Drain Saturation Current (Pulsed)	I_{DSS}	- 20	- 125	- 7	- 70	mA	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V}$	
Drain Cutoff Current	$I_{D(OFF)}$		- 1		- 1	nA	$V_{DS} = -15\text{V}, V_{GS} = 10\text{V}$	

Dynamic Electrical Characteristics

		Max	Max			
Drain Source ON Resistance	$r_{ds(on)}$	85	85	Ω	$V_{GS} = 0, V_{DS} \leq 0.1\text{V}$	$f = 1\ \text{kHz}$

Dynamic Electrical Characteristics

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

Switching Characteristics

						J174	J175	
Turn ON Delay Time	$t_{d(on)}$	2	5	ns	V_{DD}	- 10	- 6	V
Rise Time	t_r	5	10	ns	$V_{GS(OFF)}$	12	8	V
Turn OFF Delay Time	$t_{d(off)}$	5	10	ns	R_L	560	1.2k	Ω
Fall Time	t_f	10	20	ns	$V_{GS(ON)}$	0	0	V

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Gate, 3 Source

Surface Mount

SMPJ174, SMPJ175



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www.interfet.com

J176, J177

P-Channel Silicon Junction Field-Effect Transistor

- Choppers
- Commutators
- Analog Switches

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

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

At 25°C free air temperature:

Static Electrical Characteristics

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

Dynamic Electrical Characteristics

		Max	Max			
Drain Source ON Resistance	$r_{ds(on)}$	250	300	Ω	$V_{GS} = \emptyset, V_{DS} < = 0.1\text{V}$	$f = 1\ \text{kHz}$

Dynamic Electrical Characteristics

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

Switching Characteristics

						J176	J177	
Turn ON Delay Time	$t_{d(on)}$	15	20	ns	V_{DD}	- 6	- 6	V
Rise Time	t_r	20	25	ns	$V_{GS(OFF)}$	6	3	V
Turn OFF Delay Time	$t_{d(off)}$	15	20	ns	R_L	5.6k	10k	Ω
Fall Time	t_f	20	25	ns	$V_{GS(ON)}$	\emptyset	\emptyset	V

TO-226AA Package

Dimensions in Inches (mm)

Pin Configuration

1 Drain, 2 Gate, 3 Source

Surface Mount

SMPJ176, SMPJ177

2N5114, 2N5115, 2N5116

P-Channel Silicon Junction Field-Effect Transistor

• Analog Switches

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

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

At 25°C free air temperature:
Static Electrical Characteristics

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

Dynamic Electrical Characteristics

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

Switching Characteristics

		2N5114		2N5115		2N5116		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

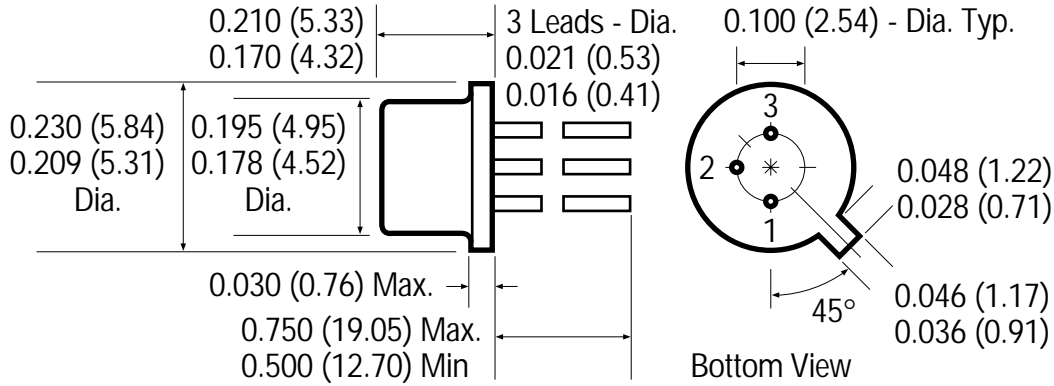
See Section G for Outline Dimensions

Pin Configuration

1 Source 1, 2 Gate & Case, 3 Drain

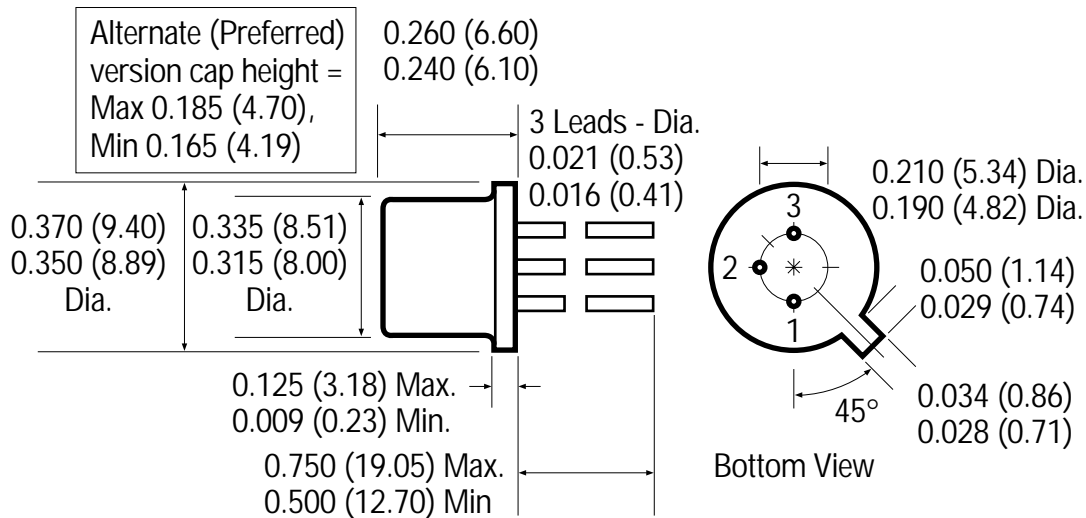
TO-18 Package

Dimensions in Inches (mm)



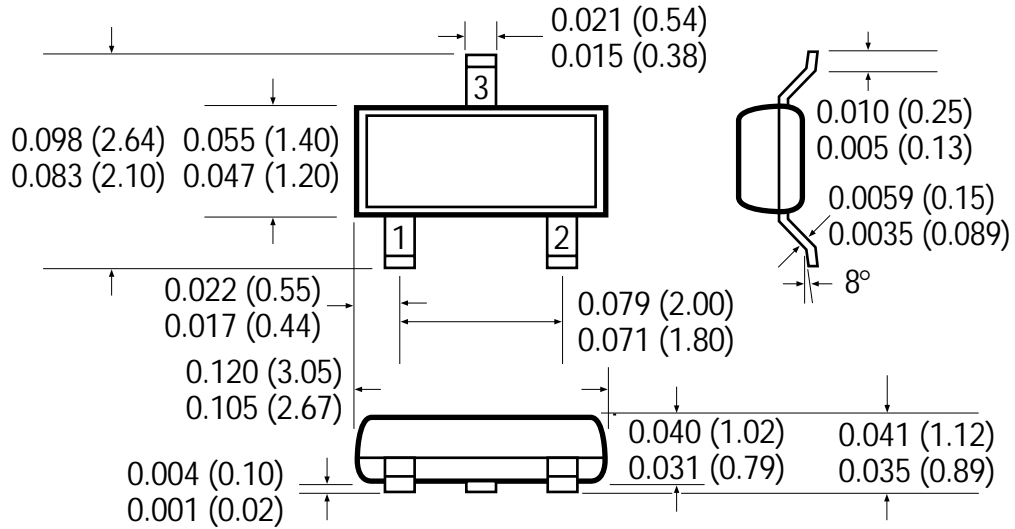
TO-39 Package

Dimensions in Inches (mm)



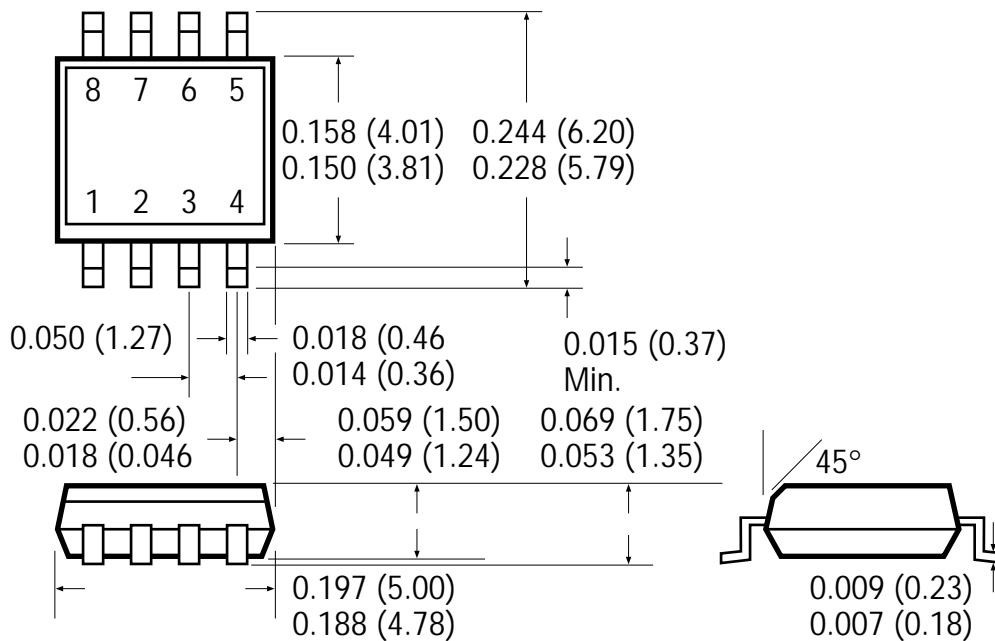
TO-236AB Package (SOT-23)

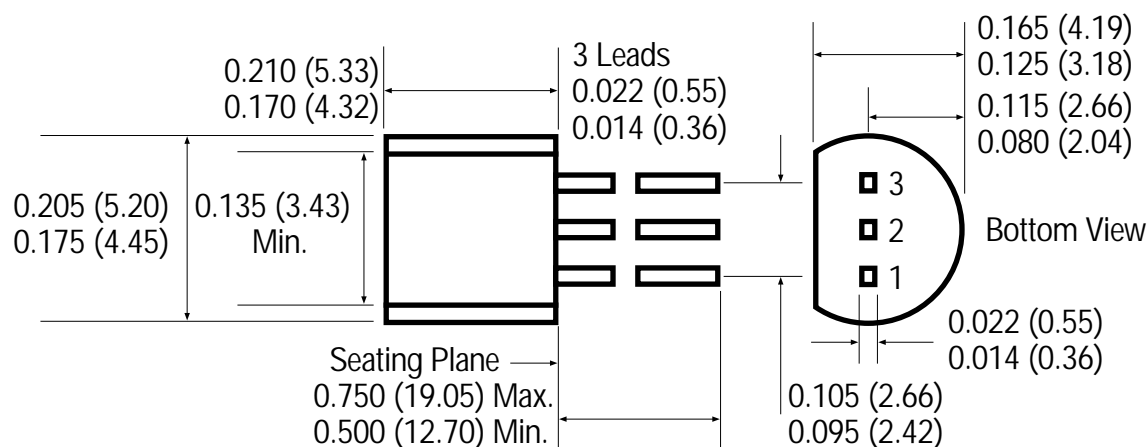
Dimensions in Inches (mm)



SOIC-8 Package

Dimensions in Inches (mm)



TO-226AA Package (TO-92)**Dimensions in Inches (mm)****TO-226AB Package (TO-92/18)****Dimensions in Inches (mm)**