



## P-Channel JFETs

J174	SST174
J175	SST175
J176	SST176
J177	SST177

PRODUCT SUMMARY				
Part Number	$V_{GS(off)}$ (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$I_{D(off)}$ Typ (pA)	$t_{ON}$ Typ (ns)
J/SST174	5 to 10	85	-10	25
J/SST175	3 to 6	125	-10	25
J/SST176	1 to 4	250	-10	25
J/SST177	0.8 to 2.25	300	-10	25

### FEATURES

- Low On-Resistance: J174 <85  $\Omega$
- Fast Switching— $t_{ON}$ : 25 ns
- Low Leakage: -10 pA
- Low Capacitance: 5 pF
- Low Insertion Loss

### BENEFITS

- Low Error Voltage
- High-Speed Analog Circuit Performance
- Negligible “Off-Error,” Excellent Accuracy
- Good Frequency Response
- Eliminates Additional Buffering

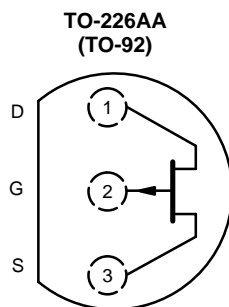
### APPLICATIONS

- Analog Switches
- Choppers
- Sample-and-Hold
- Normally “On” Switches
- Current Limiters

### DESCRIPTION

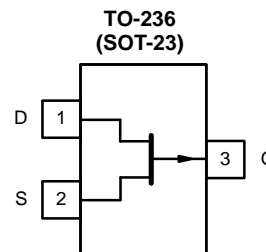
The J/SST174 series consists of p-channel analog switches designed to provide low on-resistance and fast switching. This series simplifies series-shunt switching applications when combined with the Siliconix J/SST111 series.

The TO-226AA (TO-92) plastic package provides a low-cost option, while the TO-236 (SOT-23) package provides surface-mount capability. Both the J and SST series are available in tape-and-reel for automated assembly (see Packaging Information).



Top View

J174  
J175  
J176  
J177



Top View

SST174 (S4)\*  
SST175 (S5)\*  
SST176 (S6)\*  
SST177 (S7)\*

\*Marking Code for TO-236

For applications information see AN104.



### ABSOLUTE MAXIMUM RATINGS

Gate-Drain Voltage ..... 30 V  
 Gate-Source Voltage ..... 30 V  
 Gate Current ..... -50 mA  
 Storage Temperature ..... -55 to 150°C  
 Operating Junction Temperature ..... -55 to 150°C

Lead Temperature (1/16" from case for 10 sec.) ..... 300°C  
 Power Dissipation<sup>a</sup> ..... 350 mW

Notes  
 a. Derate 2.8 mW/°C above 25°C

SPECIFICATIONS FOR J/SST174 AND J/SST175 (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				J/SST174		J/SST175		
				Min	Max	Min	Max	
<b>Static</b>								
Gate-Source Breakdown Voltage	V <sub>(BR)GSS</sub>	I <sub>G</sub> = 1 μA, V <sub>DS</sub> = 0 V	45	30		30		V
Gate-Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -10 nA		5	10	3	6	
Saturation Drain Current <sup>b</sup>	I <sub>DSS</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V		-20	-135	-7	-70	mA
Gate Reverse Current	I <sub>GSS</sub>	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V T <sub>A</sub> = 125°C	0.01 5		1		1	nA
Gate Operating Current	I <sub>G</sub>	V <sub>DG</sub> = -15 V, I <sub>D</sub> = -1 mA	0.01					nA
Drain Cutoff Current	I <sub>D(off)</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 10 V T <sub>A</sub> = 125°C	-0.01 -5		-1		-1	
Drain-Source On-Resistance	r <sub>DS(on)</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -0.1 V			85		125	Ω
Gate-Source Forward Voltage	V <sub>GS(F)</sub>	I <sub>G</sub> = -1 mA, V <sub>DS</sub> = 0 V	-0.7					V
<b>Dynamic</b>								
Common-Source Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -1 mA f = 1 kHz	4.5					mS
Common-Source Output Conductance	g <sub>os</sub>		20					μS
Drain-Source On-Resistance	r <sub>ds(on)</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 0 mA, f = 1 kHz			85		125	Ω
Common-Source Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 0 V, f = 1 MHz	20					pF
Common-Source Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 10 V f = 1 MHz	5					
Equivalent Input Noise Voltage	e <sub>n</sub>	V <sub>DG</sub> = -10 V, I <sub>D</sub> = -1 mA f = 1 kHz	20					nV/ √Hz
<b>Switching</b>								
Turn-On Time	t <sub>d(on)</sub>	V <sub>GS(L)</sub> = 0 V, V <sub>GS(H)</sub> = 10 V See Switching Circuit	10					ns
	t <sub>r</sub>		15					
Turn-Off Time	t <sub>d(off)</sub>		10					
	t <sub>f</sub>		20					

Notes  
 a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.  
 b. Pulse test: PW ≤ 300 μs duty cycle ≤ 3%.

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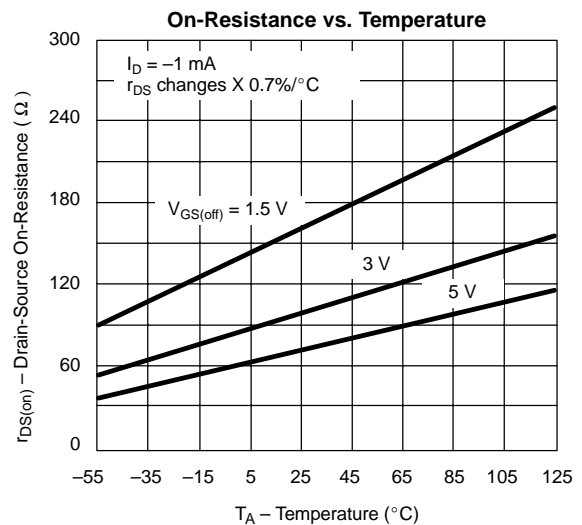
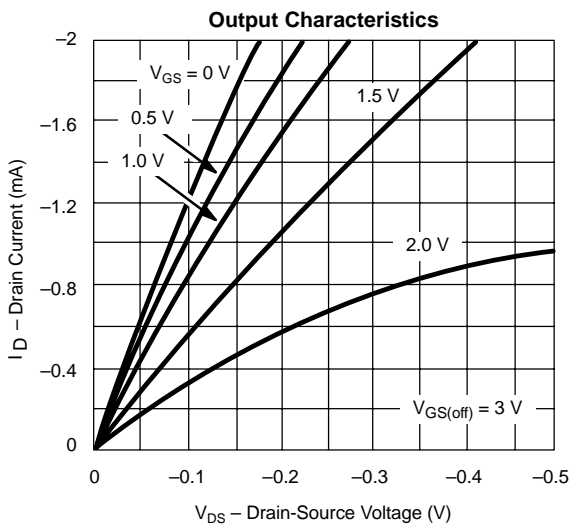
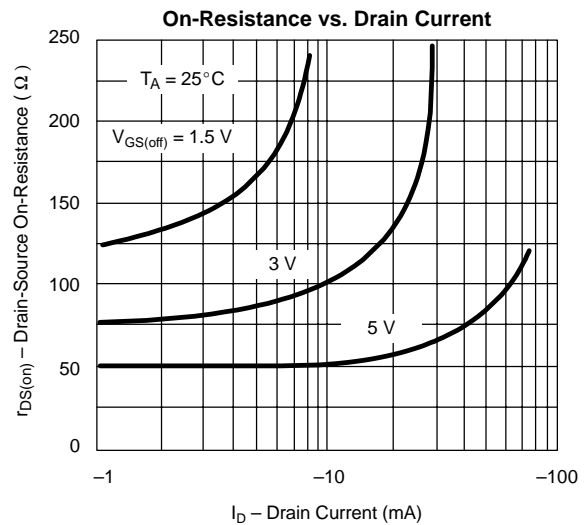
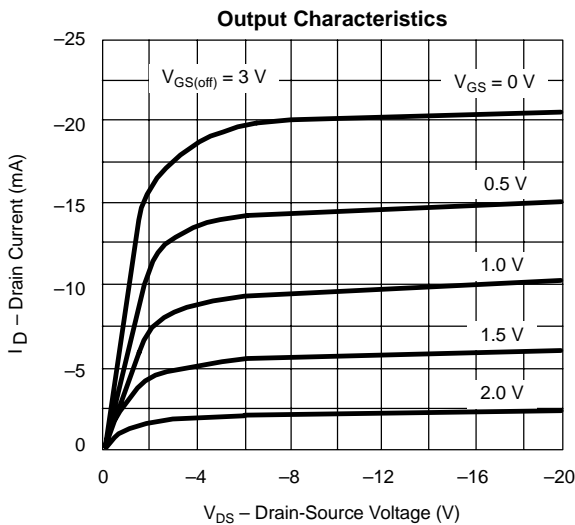
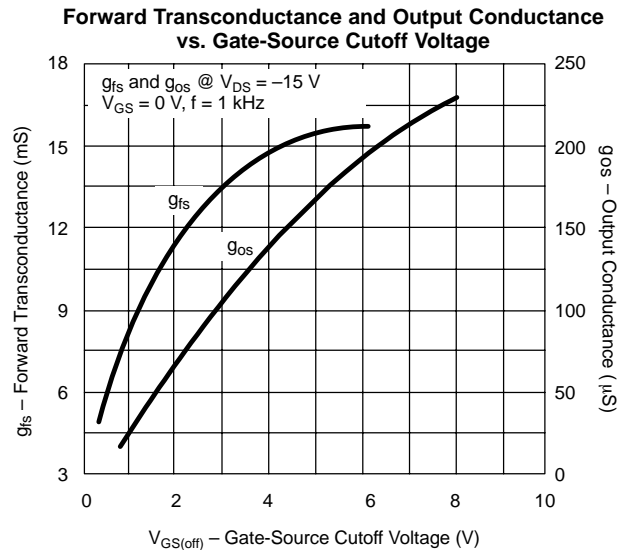
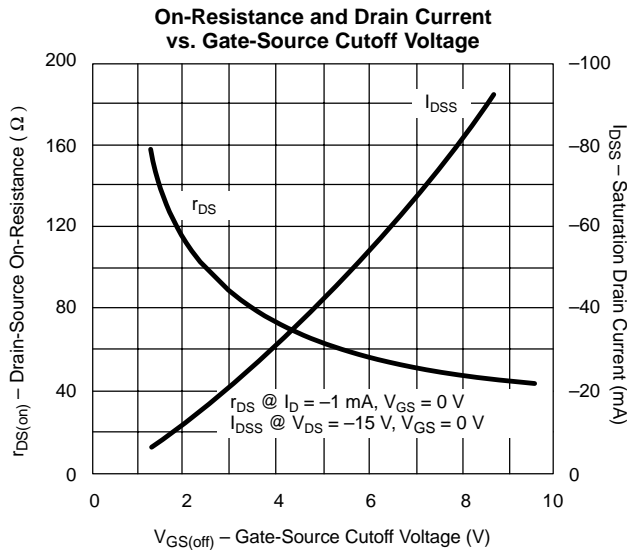
SPECIFICATIONS FOR J/SST176 AND J/SST177 (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				J/SST176		J/SST177		
				Min	Max	Min	Max	
<b>Static</b>								
Gate-Source Breakdown Voltage	V <sub>(BR)GSS</sub>	I <sub>G</sub> = 1 μA, V <sub>DS</sub> = 0 V	45	30		30		V
Gate-Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -10 nA		1	4	0.8	2.25	
Saturation Drain Current <sup>b</sup>	I <sub>DSS</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V		-2	-35	-1.5	-20	mA
Gate Reverse Current	I <sub>GSS</sub>	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V	0.01		1		1	nA
		T <sub>A</sub> = 125 °C	5					
Gate Operating Current	I <sub>G</sub>	V <sub>DG</sub> = -15 V, I <sub>D</sub> = -1 mA	0.01					nA
Drain Cutoff Current	I <sub>D(off)</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 10 V	-0.01		-1		-1	
		T <sub>A</sub> = 125 °C	-5					
Drain-Source On-Resistance	r <sub>DS(on)</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -0.1 V			250		300	Ω
Gate-Source Forward Voltage	V <sub>GS(F)</sub>	I <sub>G</sub> = -1 mA, V <sub>DS</sub> = 0 V	-0.7					V
<b>Dynamic</b>								
Common-Source Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -1 mA f = 1 kHz	4.5					mS
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Common-Source Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 0 V, f = 1 MHz	20					pF
Common-Source Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 10 V f = 1 MHz	5					
Equivalent Input Noise Voltage	e <sub>n</sub>	V <sub>DG</sub> = -10 V, I <sub>D</sub> = -1 mA f = 1 kHz	20					nV/ √Hz
<b>Switching</b>								
Turn-On Time	t <sub>d(on)</sub>	V <sub>GS(L)</sub> = 0 V, V <sub>GS(H)</sub> = 10 V See Switching Circuit	10					ns
	t <sub>r</sub>		15					
Turn-Off Time	t <sub>d(off)</sub>		10					
	t <sub>f</sub>		20					

Notes

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

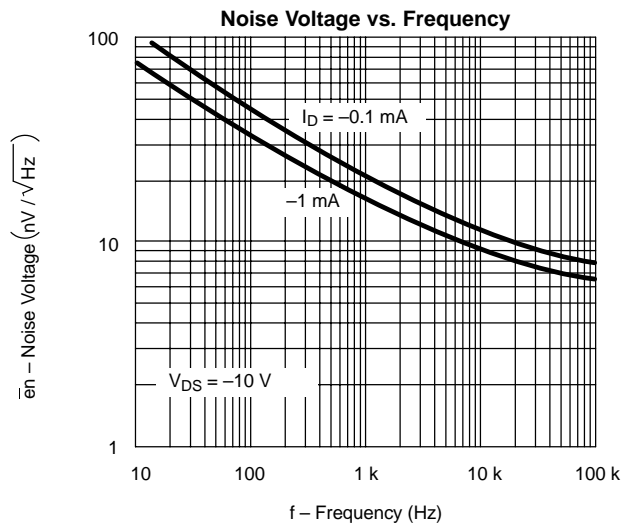
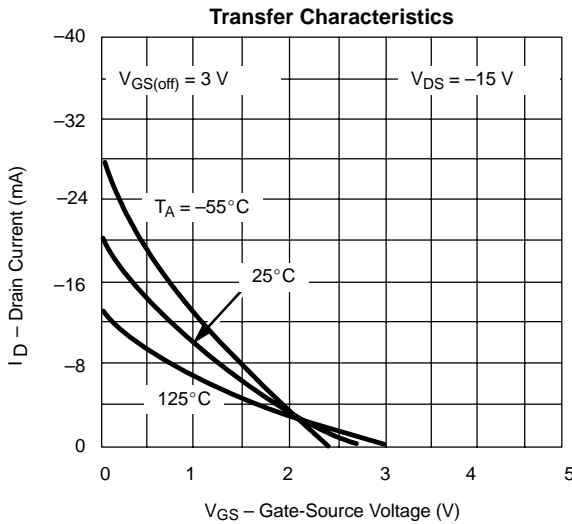
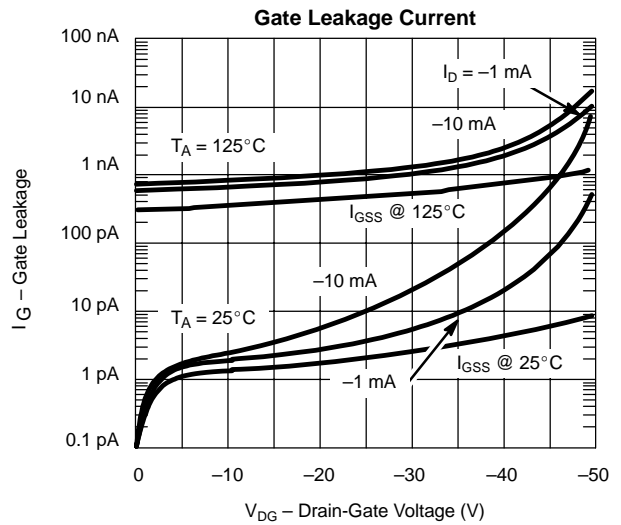
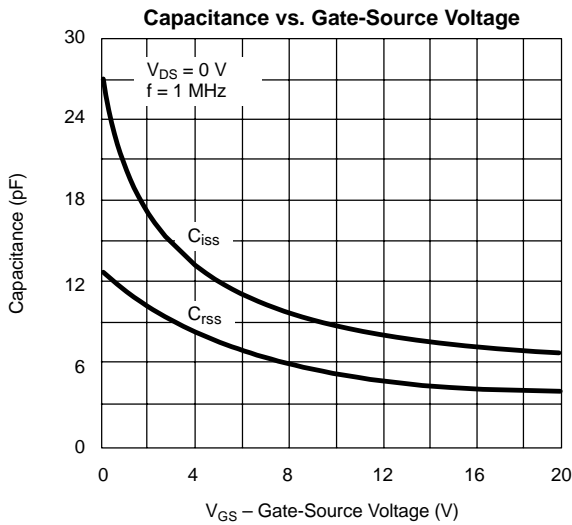
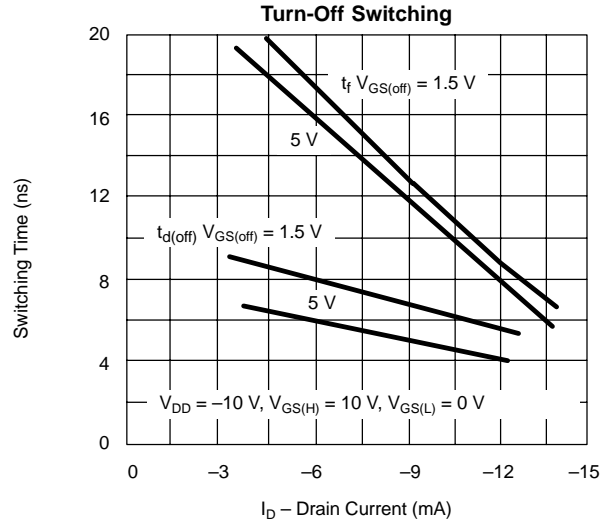
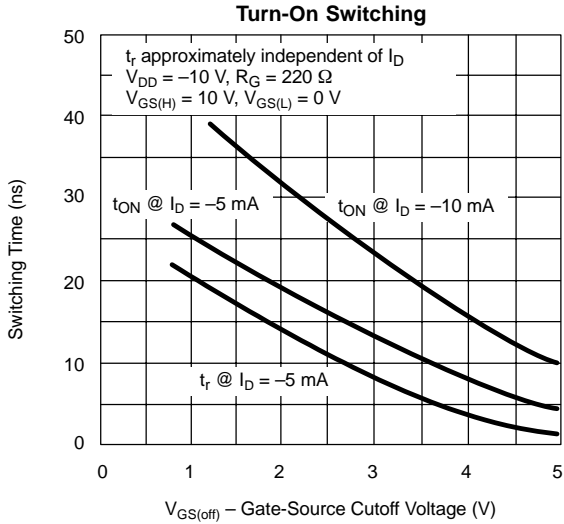
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**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**





**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)**



SWITCHING TIME TEST CIRCUIT				
	174	175	176	177
$V_{DD}$	-10 V	-6 V	-6 V	-6 V
$V_{GG}$	20 V	12 V	8 V	5 V
$R_L^*$	560 $\Omega$	750 $\Omega$	1800 $\Omega$	5600 $\Omega$
$R_G^*$	100 $\Omega$	220 $\Omega$	390 $\Omega$	390 $\Omega$
$I_{D(on)}$	-15 mA	-7 mA	-3 mA	-1 mA

\*Non-inductive

### INPUT PULSE

Rise Time < 1 ns  
 Fall Time < 1 ns  
 Pulse Width 100 ns  
 PRF 1 MHz

### SAMPLING SCOPE

Rise Time 0.4 ns  
 Input Resistance 10 M $\Omega$   
 Input Capacitance 1.5 pF

See Typical Characteristics curves for changes.

