P-Channel JFETs

J174 SST174
J175 SST175
J176 SST176
J177 SST177

PRODUCT SUMMARY				
Part Number	**$V_{GS(off)}$ (V)**	**$r_{DS(on)}$ Max (Ω)**	**$I_{D(off)}$ 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 Ω
- 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

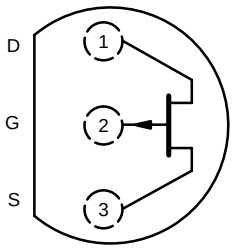
- Analog Switches
- Choppers
- Sample-and-Hold
- Normally “On” Switches
- Current Limiters

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).

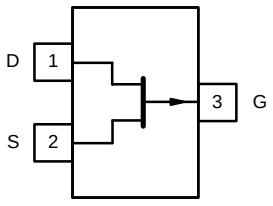
TO-226AA
(TO-92)



Top View

J174
J175
J176
J177

TO-236
(SOT-23)



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[a] . . . . . 350 mW

Notes
a. Derate 2.8 mW/°C above 25°C

SPECIFICATIONS FOR J/SST174 AND J/SST175 (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Typ[a]	Limits J/SST174 Min	Limits J/SST174 Max	Limits J/SST175 Min	Limits J/SST175 Max	Unit
Static								
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = 1 μA , V_{DS} = 0 V	45	30		30		V
Gate-Source Cutoff Voltage	$V_{GS(off)}$	V_{DS} = –15 V, I_D = –10 nA		5	10	3	6	V
Saturation Drain Current[b]	I_{DSS}	V_{DS} = –15 V, V_{GS} = 0 V		–20	–135	–7	–70	mA
Gate Reverse Current	I_{GSS}	V_{GS} = 20 V, V_{DS} = 0 V	0.01		1		1	nA
		T_A = 125°C	5					
Gate Operating Current	I_G	V_{DG} = –15 V, I_D = –1 mA	0.01					
Drain Cutoff Current	$I_{D(off)}$	V_{DS} = –15 V, V_{GS} = 10 V	–0.01		–1		–1	
		T_A = 125°C	–5					
Drain-Source On-Resistance	$r_{DS(on)}$	V_{GS} = 0 V, V_{DS} = –0.1 V			85		125	Ω
Gate-Source Forward Voltage	$V_{GS(F)}$	I_G = –1 mA , V_{DS} = 0 V	–0.7					V
Dynamic								
Common-Source Forward Transconductance	g_{fs}	V_{DS} = –15 V, I_D = –1 mA f = 1 kHz	4.5					mS
Common-Source Output Conductance	g_{os}		20					μS
Drain-Source On-Resistance	$r_{ds(on)}$	V_{GS} = 0 V, I_D = 0 mA , f = 1 kHz			85		125	Ω
Common-Source Input Capacitance	C_{iss}	V_{DS} = 0 V, V_{GS} = 0 V, f = 1 MHz	20					pF
Common-Source Reverse Transfer Capacitance	C_{rss}	V_{DS} = 0 V, V_{GS} = 10 V f = 1 MHz	5					
Equivalent Input Noise Voltage	$\overline{e}_n$	V_{DG} = –10 V, I_D = –1 mA f = 1 kHz	20					$nV/\sqrt{Hz}$
Switching								
Turn-On Time	$t_{d(on)}$	$V_{GS(L)}$ = 0 V, $V_{GS(H)}$ = 10 V See Switching Circuit	10					ns
	t_r		15					
Turn-Off Time	$t_{d(off)}$		10					
	t_f		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%.

PSCIA

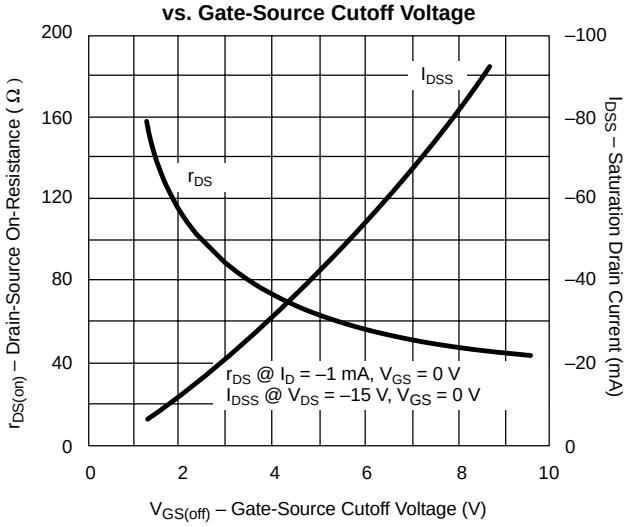
SPECIFICATIONS FOR J/SST176 AND J/SST177 (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Typ[a]	Limits J/SST176 Min	Limits J/SST176 Max	Limits J/SST177 Min	Limits J/SST177 Max	Unit
Static								
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = 1 μA , V_{DS} = 0 V	45	30		30		V
Gate-Source Cutoff Voltage	$V_{GS(off)}$	V_{DS} = –15 V, I_D = –10 nA		1	4	0.8	2.25	V
Saturation Drain Current[b]	I_{DSS}	V_{DS} = –15 V, V_{GS} = 0 V		–2	–35	–1.5	–20	mA
Gate Reverse Current	I_{GSS}	V_{GS} = 20 V, V_{DS} = 0 V	0.01		1		1	nA
		T_A = 125°C	5					
Gate Operating Current	I_G	V_{DG} = –15 V, I_D = –1 mA	0.01					
Drain Cutoff Current	$I_{D(off)}$	V_{DS} = –15 V, V_{GS} = 10 V	–0.01		–1		–1	
		T_A = 125°C	–5					
Drain-Source On-Resistance	$r_{DS(on)}$	V_{GS} = 0 V, V_{DS} = –0.1 V			250		300	Ω
Gate-Source Forward Voltage	$V_{GS(F)}$	I_G = –1 mA , V_{DS} = 0 V	–0.7					V
Dynamic								
Common-Source Forward Transconductance	g_{fs}	V_{DS} = –15 V, I_D = –1 mA f = 1 kHz	4.5					mS
Common-Source Output Conductance	g_{os}		20					μS
Drain-Source On-Resistance	$r_{ds(on)}$	V_{GS} = 0 V, I_D = 0 mA , f = 1 kHz			250		300	Ω
Common-Source Input Capacitance	C_{iss}	V_{DS} = 0 V, V_{GS} = 0 V, f = 1 MHz	20					pF
Common-Source Reverse Transfer Capacitance	C_{rss}	V_{DS} = 0 V, V_{GS} = 10 V f = 1 MHz	5					
Equivalent Input Noise Voltage	$\overline{e}_n$	V_{DG} = –10 V, I_D = –1 mA f = 1 kHz	20					nV/√Hz
Switching								
Turn-On Time	$t_{d(on)}$	$V_{GS(L)}$ = 0 V, $V_{GS(H)}$ = 10 V See Switching Circuit	10					ns
	t_r		15					
Turn-Off Time	$t_{d(off)}$		10					
	t_f		20					

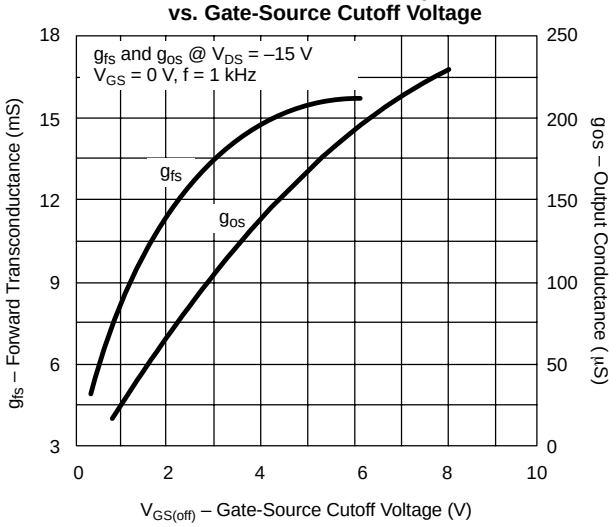
Notes
a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing. PSCIA
b. Pulse test: PW ≤ 300 μs duty cycle ≤ 3%.

TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

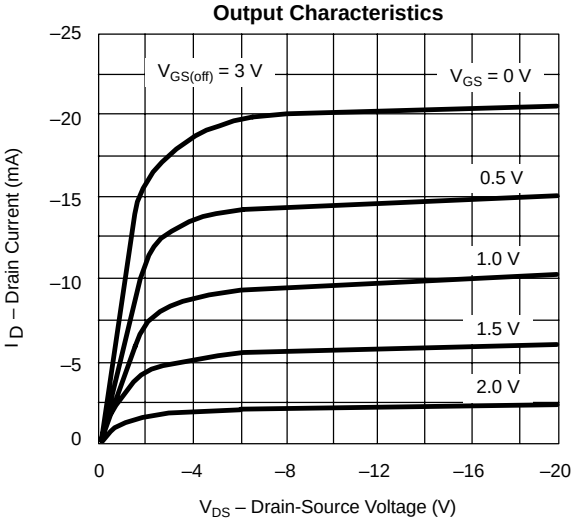
On-Resistance and Drain Current vs. Gate-Source Cutoff Voltage



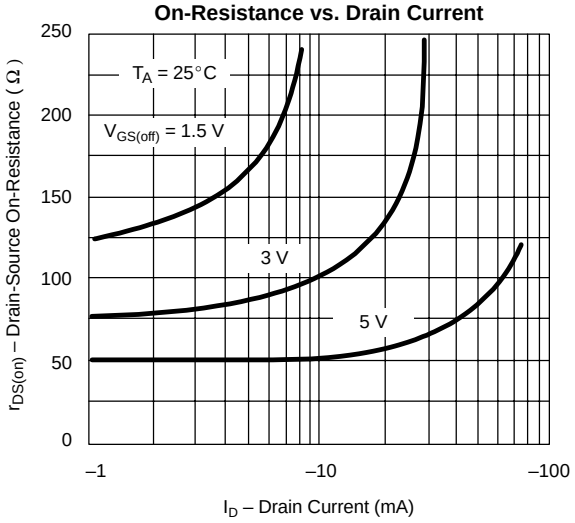
Forward Transconductance and Output Conductance vs. Gate-Source Cutoff Voltage



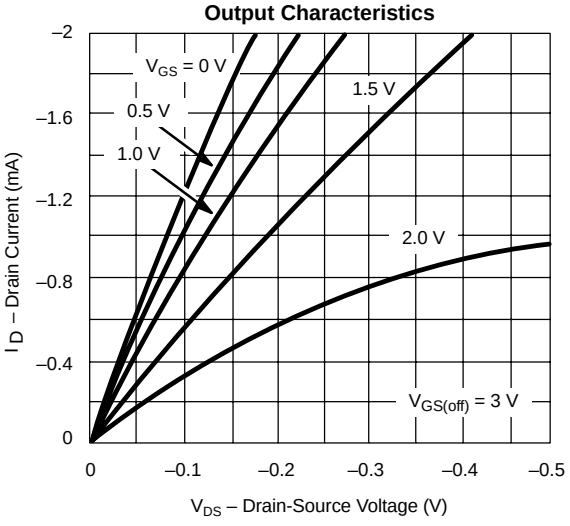
Output Characteristics



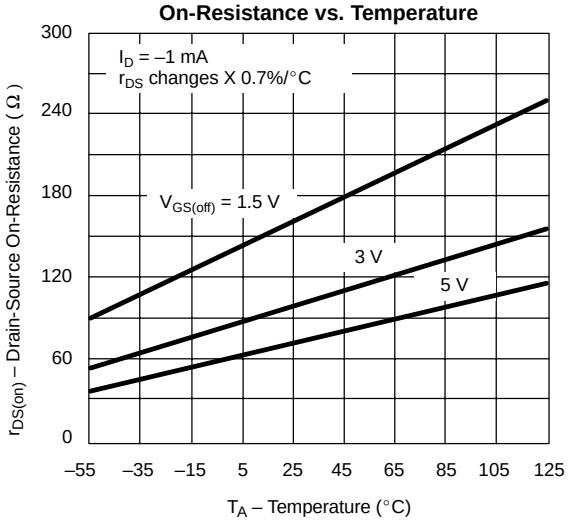
On-Resistance vs. Drain Current



Output Characteristics

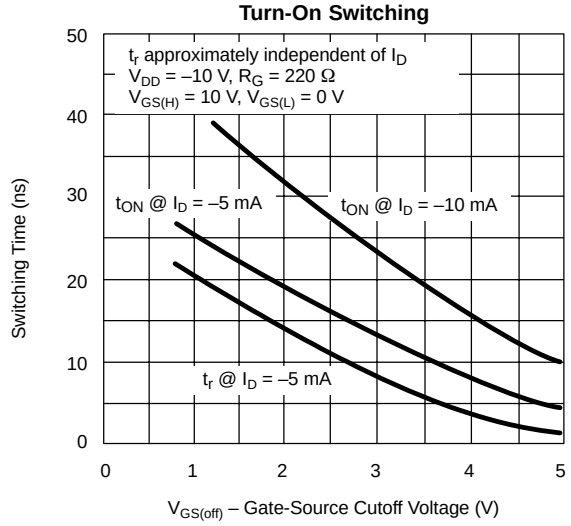


On-Resistance vs. Temperature

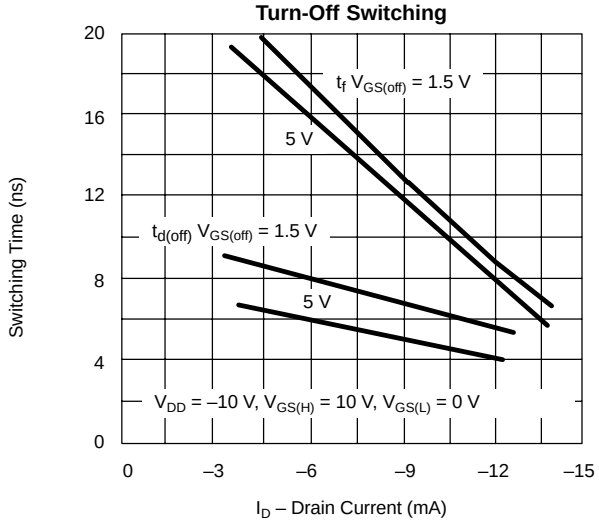


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

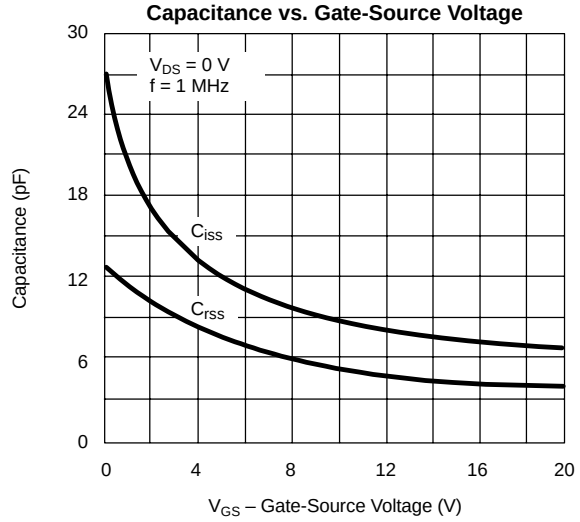
Turn-On Switching



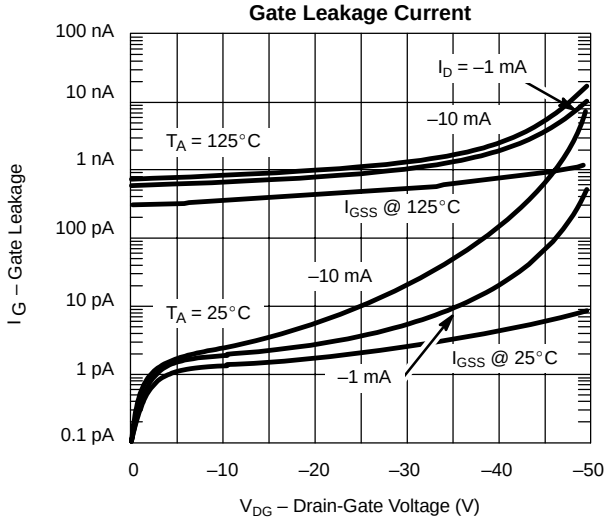
Turn-Off Switching



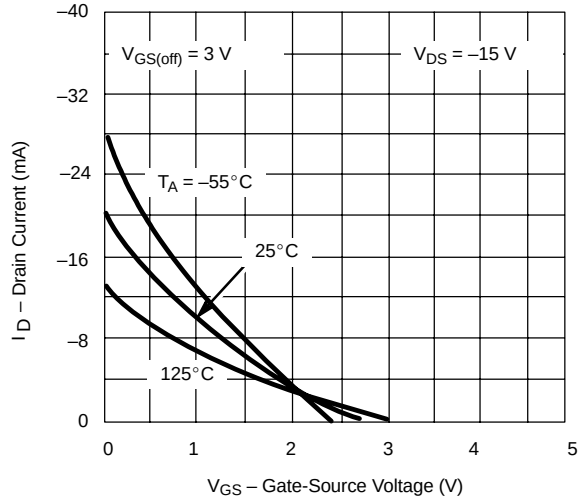
Capacitance vs. Gate-Source Voltage



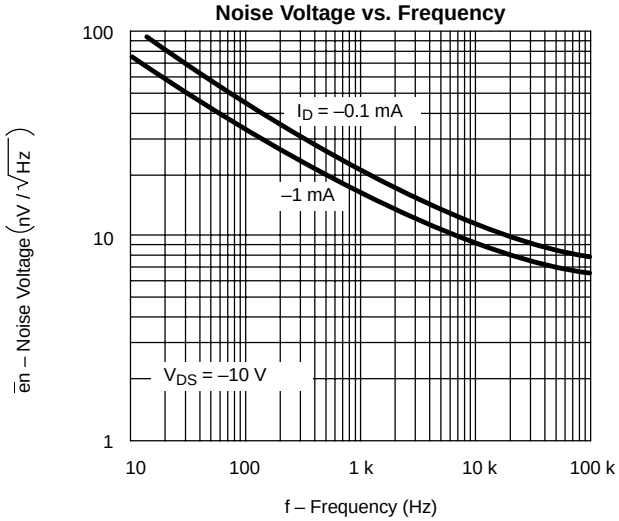
Gate Leakage Current



Transfer Characteristics



Noise Voltage vs. Frequency



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 Ω	750 Ω	1800 Ω	5600 Ω
R_G*	100 Ω	220 Ω	390 Ω	390 Ω
$I_{D(on)}$	–15 mA	–7 mA	–3 mA	–1 mA

*Non-inductive

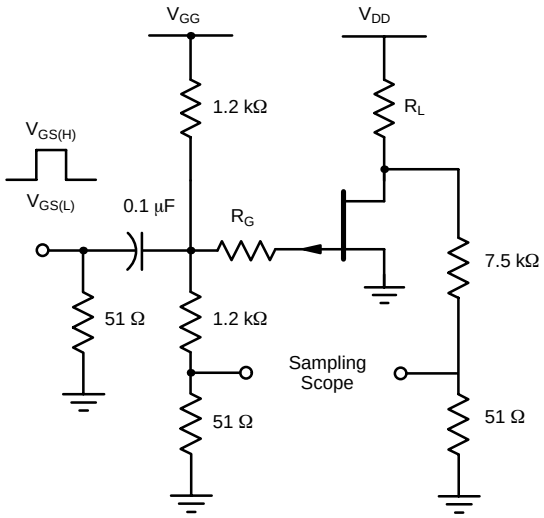
INPUT PULSE

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 MΩ
Input Capacitance 1.5 pF

See Typical Characteristics curves for changes.



Document Number: 70257
S-04030—Rev. E, 04-Jun-01

Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.