N-Channel JFETs

Product Summary

Part Number	$V_{GS(off)}$ (V)	$r_{DS(on)}$ Max (Ω)	$I_{D(off)}$ Typ (pA)	t_{ON} Typ (ns)
J105	–4.5 to –10	3	10	14
J106	–2 to –6	6	10	14
J107	–0.5 to –4.5	8	10	14

Features

- Low On-Resistance: J105 < 3 Ω
- Fast Switching—t_{ON}: 14 ns
- Low Leakage: 10 pA
- Low Capacitance: 20 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

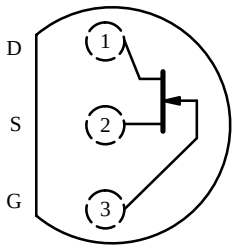
- Analog Switches
- Choppers
- Sample-and-Hold
- Normally “On” Switches
- Current Limiters

Description

The J105/106/107 are high-performance JFET analog switches designed to offer low on-resistance and fast switching. $r_{DS(on)}$ <3 Ω is guaranteed for the J105 making this device the lowest of any commercially available JFET.

The low cost TO-226AA (TO-92) plastic package is available in a wide range of tape-and-reel options (see Packaging Information). For similar products in TO-206AC (TO-52) packaging, see the U290/291 data sheet.

TO-226AA
(TO-92)



Top View

Absolute Maximum Ratings

Gate-Drain, Gate-Source Voltage . . . . . –25 V
Gate Current . . . . . 50 mA
Storage Temperature . . . . . –55 to 150°C
Operating Junction Temperature . . . . . –55 to 150°C

Power Dissipation[a] . . . . . 350 mW

Notes
a. Derate 2.8 mW/°C above 25°C

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70230.

Specifications[a]

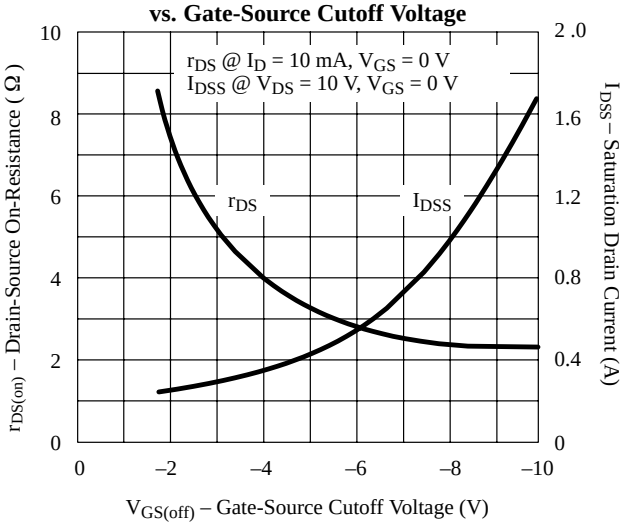
Parameter	Symbol	Test Conditions	Typ[b]	Limits J105 Min	Limits J105 Max	Limits J106 Min	Limits J106 Max	Limits J107 Min	Limits J107 Max	Unit
Static										
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = –1 µA , V_{DS} = 0 V	–35	–25		–25		–25		V
Gate-Source Cutoff Voltage	$V_{GS(off)}$	V_{DS} = 5 V, I_D = 1 µA		–4.5	–10	–2	–6	–0.5	–4.5	
Saturation Drain Current[c]	I_{DSS}	V_{DS} = 15 V, V_{GS} = 0 V		500		200		100		mA
Gate Reverse Current	I_{GSS}	V_{GS} = –15 V, V_{DS} = 0 V	–0.02		–3		–3		–3	nA
		T_A = 125°C	–10							
Gate Operating Current[c]	I_G	V_{DG} = 10 V, I_D = 25 mA	–0.01							
Drain Cutoff Current	$I_{D(off)}$	V_{DS} = 5 V, V_{GS} = –10 V	0.01		3		3		3	
		T_A = 125°C	5							
Drain-Source On-Resistance	$r_{DS(on)}$	V_{GS} = 0 V, I_D = 1 mA			3		6		8	Ω
Gate-Source Forward Voltage	$V_{GS(F)}$	I_G = 1 mA , V_{DS} = 0 V	0.7							V
Dynamic										
Common-Source Forward Transconductance[c]	g_{fs}	V_{DS} = 10 V, I_D = 25 mA f = 1 kHz	55							mS
Common-Source Output Conductance[c]	g_{os}		5							
Drain-Source On-Resistance	$r_{ds(on)}$	V_{GS} = 0 V, I_D = 0 mA f = 1 kHz			3		6		8	Ω
Common-Source Input Capacitance	C_{iss}	V_{DS} = 0 V, V_{GS} = 0 V f = 1 MHz	120		160		160		160	pF
Common-Source Reverse Transfer Capacitance	C_{rss}	V_{DS} = 0 V, V_{GS} = –10 V f = 1 MHz	20		35		35		35	
Equivalent Input Noise Voltage	$\overline{e}_n$	V_{DG} = 10 V, I_D = 25 mA f = 1 kHz	3							$\frac{nV}{\sqrt{Hz}}$
Switching										
Turn-On Time	$t_{d(on)}$	V_{DD} = 1.5 V, $V_{GS(H)}$ = 0 V See Switching Diagram	6							ns
	t_r		8							
Turn-Off Time	$t_{d(off)}$		5							
	t_f		9							

Notes
a. T_A = 25°C unless otherwise noted.
b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
c. Pulse test: PW ≤300 µs duty cycle ≤3%.

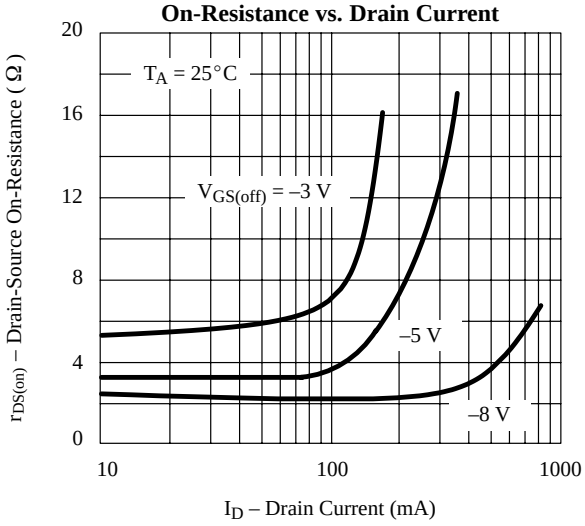
NVA

Typical Characteristics

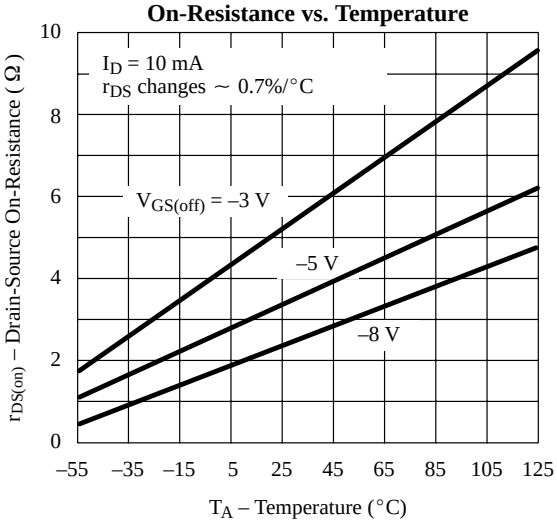
On-Resistance and Drain Current vs. Gate-Source Cutoff Voltage



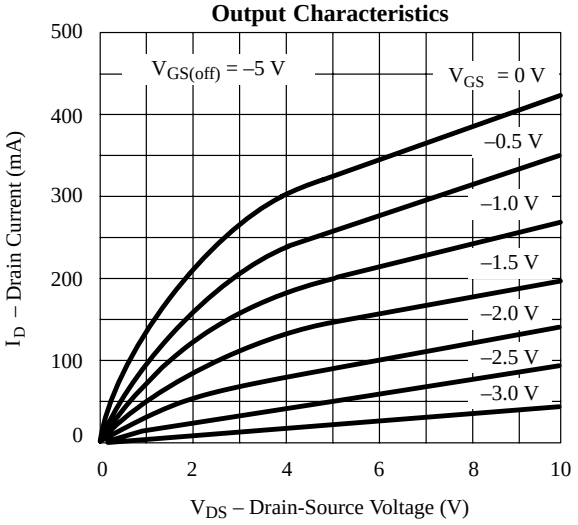
On-Resistance vs. Drain Current



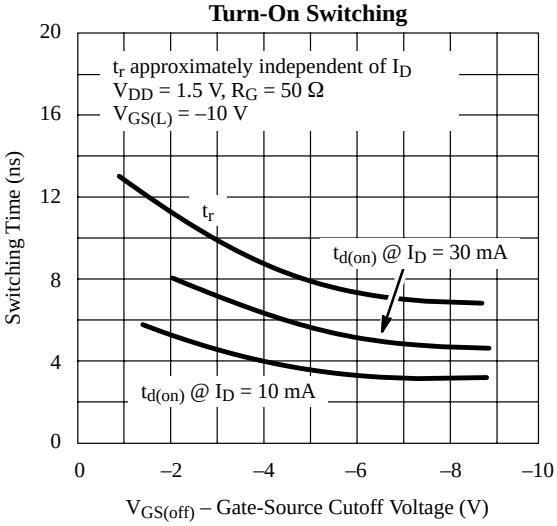
On-Resistance vs. Temperature



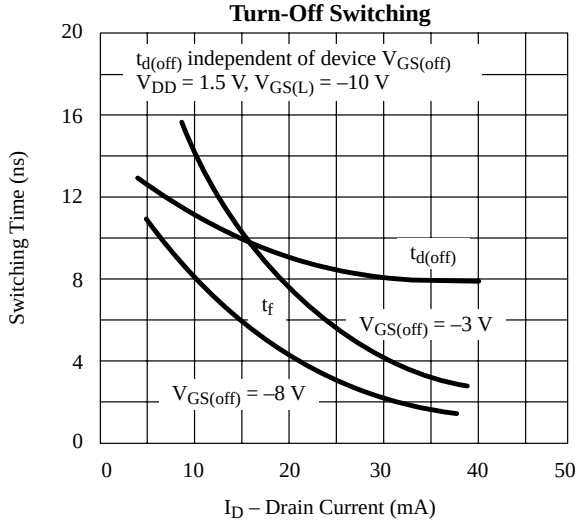
Output Characteristics



Turn-On Switching

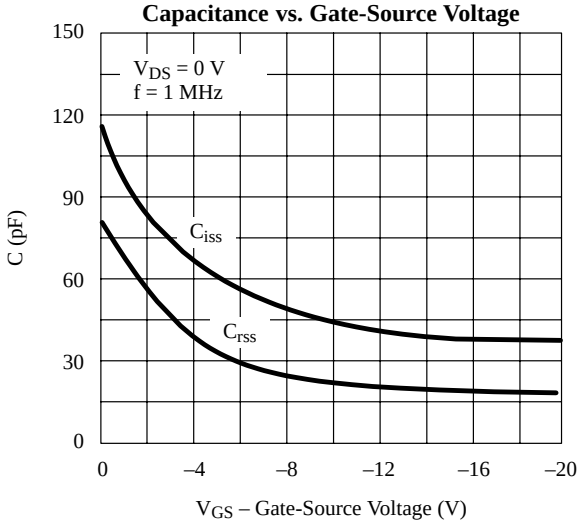


Turn-Off Switching

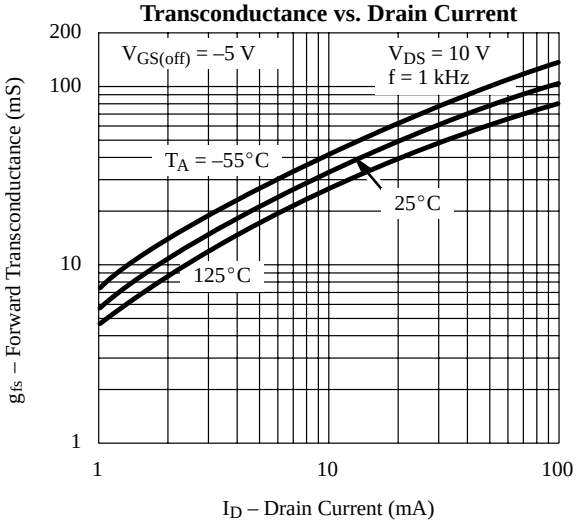


Typical Characteristics (Cont'd)

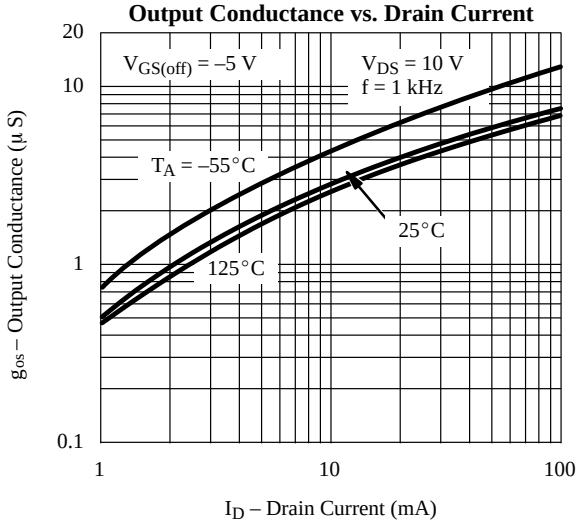
Capacitance vs. Gate-Source Voltage



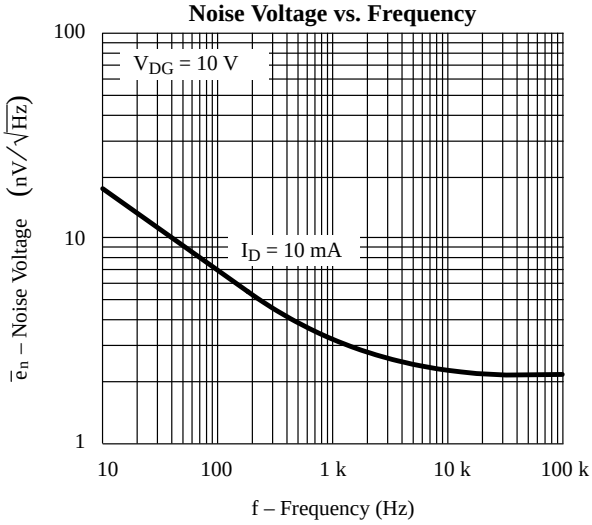
Transconductance vs. Drain Current



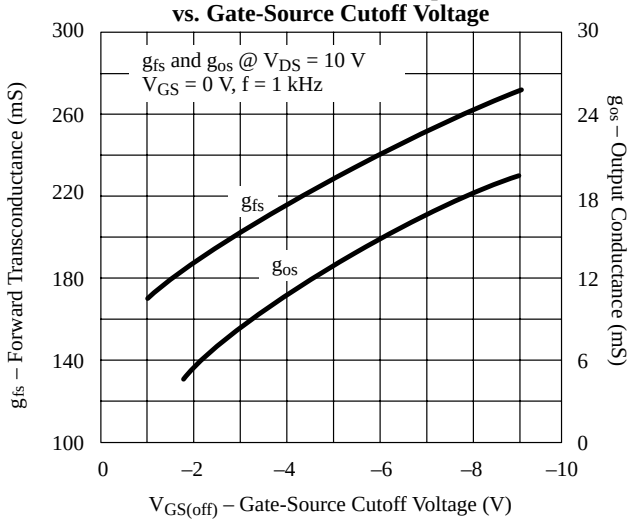
Output Conductance vs. Drain Current



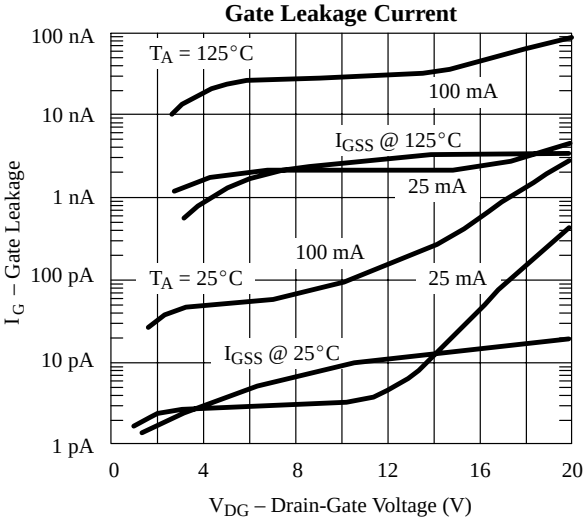
Noise Voltage vs. Frequency



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



Gate Leakage Current



Switching Time Test Circuit

	J105	**J106**	J107
$V_{GS(L)}$	–12V	–7V	–5V
R_L	50 Ω	50 Ω	50 Ω
$I_{D(on)}$	28 mA	27 mA	26 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