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## N-Channel JFETs

<b>PRODUCT SUMMARY</b>				
Part Number	$V_{GS(off)}$ (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$I_{D(off)}$ Typ ( $\mu$ A)	$t_{ON}$ Typ (ns)
U290	-4.0 to -10	3	10	14
U291	-1.5 to -4.5	7	10	14

### FEATURES

- Low On-Resistance: U290 < 3  $\Omega$
- Fast Switching— $t_{ON}$ : 14 ns
- High Off-Isolation
- 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

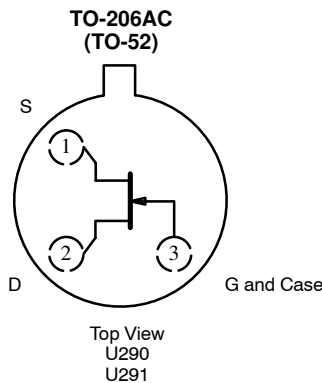
### DESCRIPTION

The U290/U291 are high-performance JFET analog switches designed to offer low on-resistance and fast switching. This series features the lowest on-resistance of any JFET in the industry today.

For similar products in TO-226A (TO-92) packaging, see the J105/106/107 data sheet.

The TO-206AC (TO-52) hermetically sealed case makes this series suitable for military applications.

Ordering Information: U290—E3  
U291—E3



### ABSOLUTE MAXIMUM RATINGS

Gate-Drain, Gate-Source Voltage . . . . . -30 V  
 Gate Current . . . . . 100 mA  
 Storage Temperature . . . . . -65 to 200°C  
 Operating Junction Temperature . . . . . -55 to 150°C

Power Dissipation<sup>a</sup> . . . . . 500 mW

Notes  
 a. Derate 4 mW/°C above 25°C



### SPECIFICATIONS (T<sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)

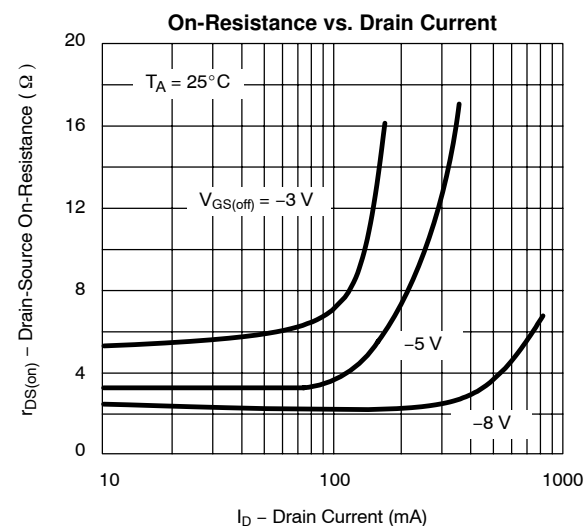
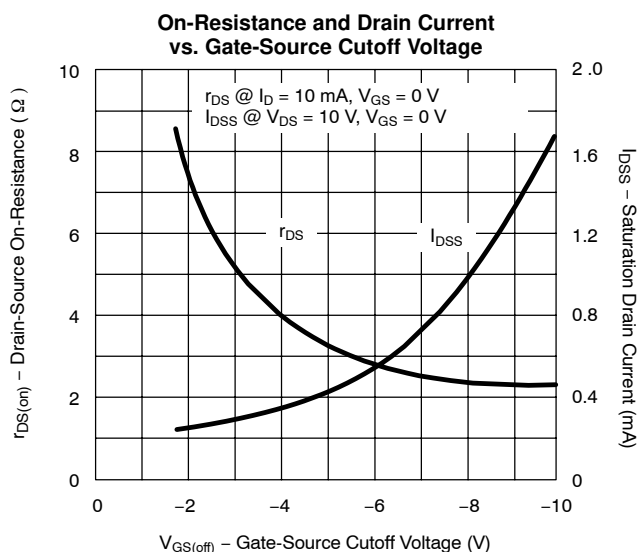
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				U290		U291		
				Min	Max	Min	Max	
<b>Static</b>								
Gate-Source Breakdown Voltage	V <sub>(BR)GSS</sub>	I <sub>G</sub> = -1 μA, V <sub>DS</sub> = 0 V	-35	-30		-30		V
Gate-Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 3 nA		-4.0	-10	-1.5	-4.5	
Saturation Drain Current <sup>b</sup>	I <sub>DSS</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V		500		200		mA
Gate Reverse Current	I <sub>GSS</sub>	V <sub>GS</sub> = -15 V, V <sub>DS</sub> = 0 V	-0.02		-1		-1	nA
		T <sub>A</sub> = 125 °C	-0.01		-1		-1	μA
Gate Operating Current <sup>b</sup>	I <sub>G</sub>	V <sub>DG</sub> = 10 V, I <sub>D</sub> = 25 mA	-0.01					nA
Drain Cutoff Current	I <sub>D(off)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = -10 V	0.01		1		1	μA
		T <sub>A</sub> = 125 °C	-0.005		1		1	μA
Drain-Source On-Resistance	r <sub>DS(on)</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA			3		7	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 <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 25 mA, f = 1 kHz	55					mS
Common-Source Output Conductance <sup>b</sup>	g <sub>os</sub>		5					
Drain-Source On-Resistance	r <sub>ds(on)</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA, f = 1 kHz			3		7	Ω
Common-Source Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 0 V, f = 1 MHz	120		160		160	pF
Common-Source Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = -15 V, f = 1 MHz	20		30		30	
Equivalent Input Noise Voltage	e <sub>n</sub>	V <sub>DG</sub> = 10 V, I <sub>D</sub> = 25 mA, f = 1 kHz	3					nV/√Hz
<b>Switching</b>								
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 1.5 V, V <sub>GS(H)</sub> = 0 V See Switching Diagram	6		15		15	ns
	t <sub>r</sub>		8		20		20	
Turn-Off Time	t <sub>d(off)</sub>		5		15		15	
	t <sub>f</sub>		9		20		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%.

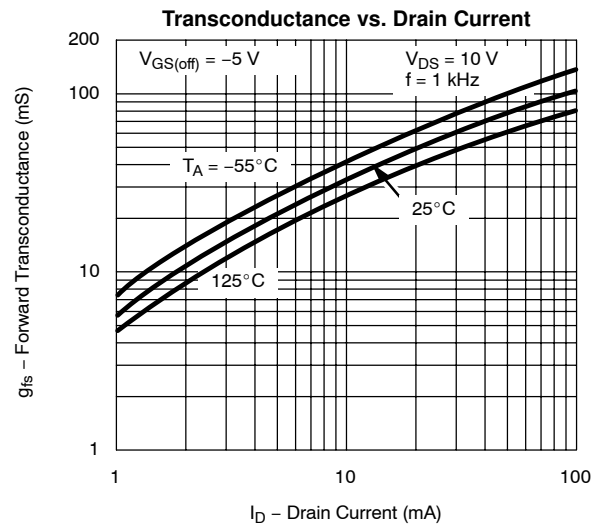
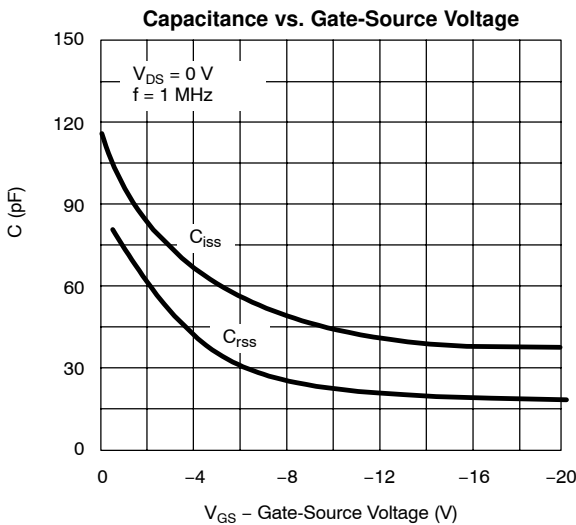
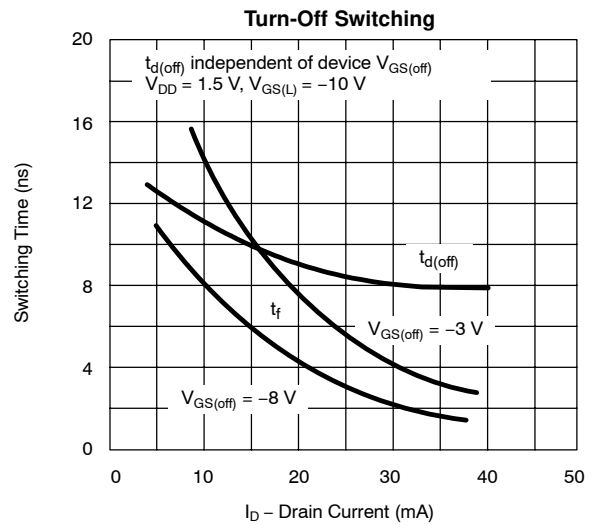
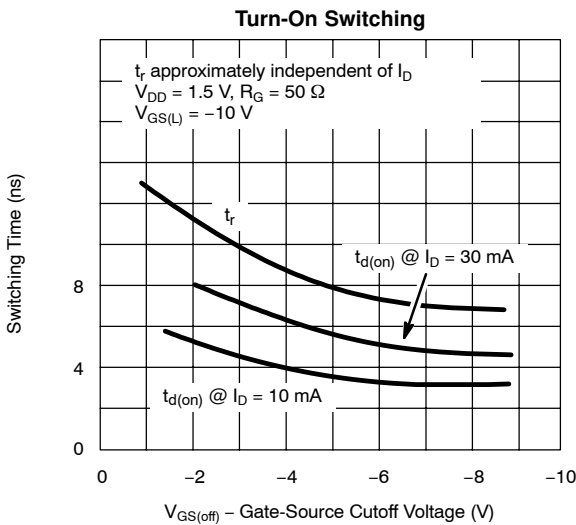
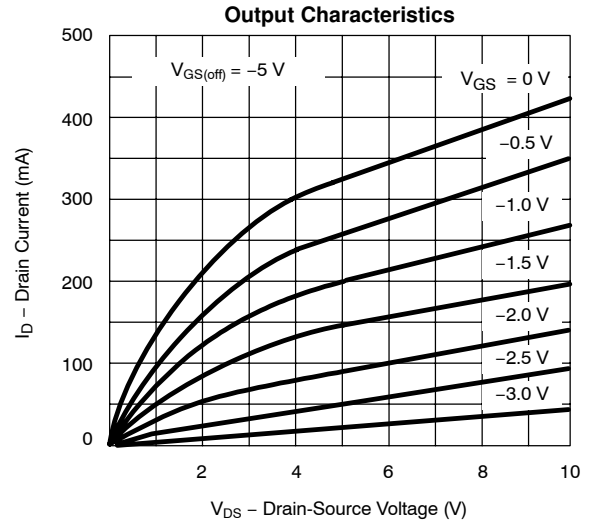
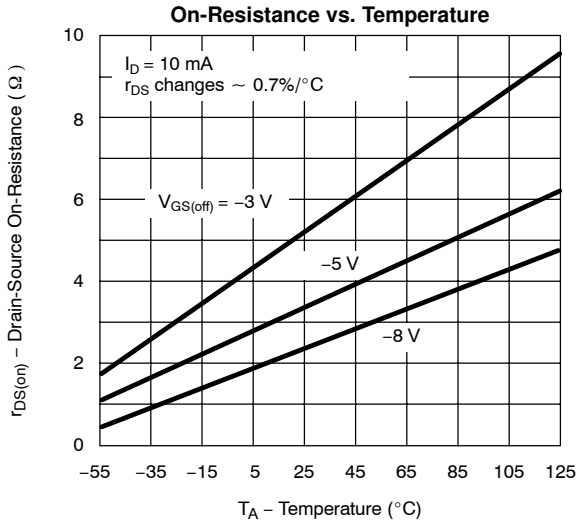
NVA

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

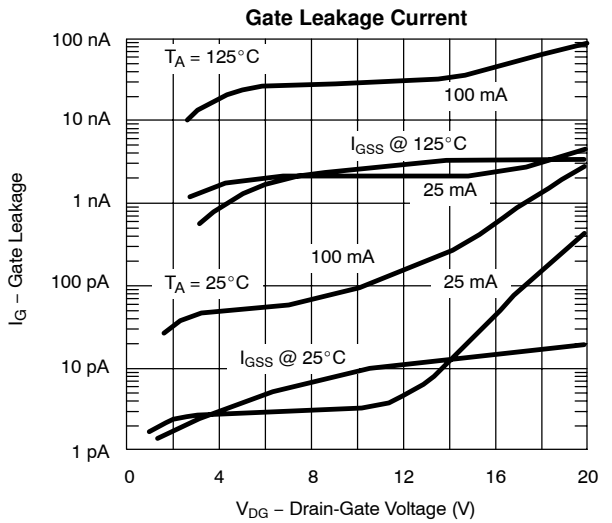
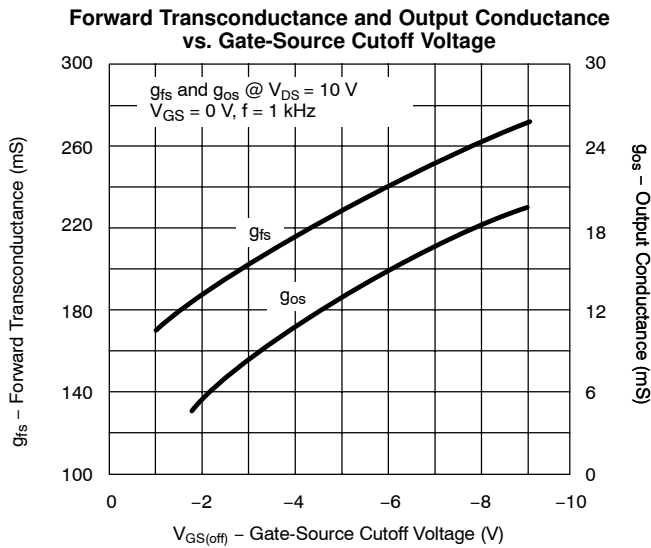
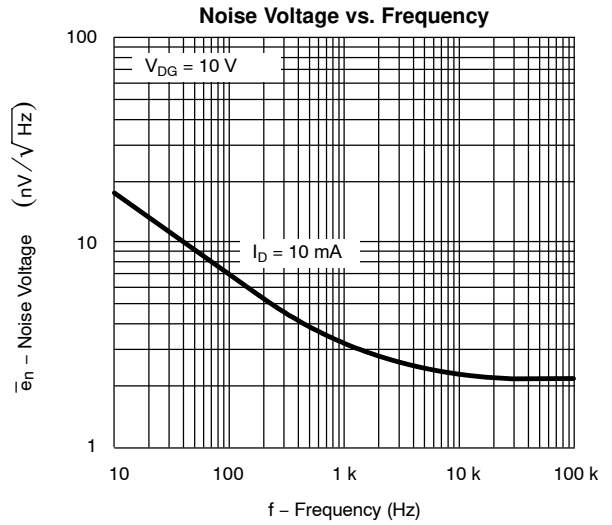
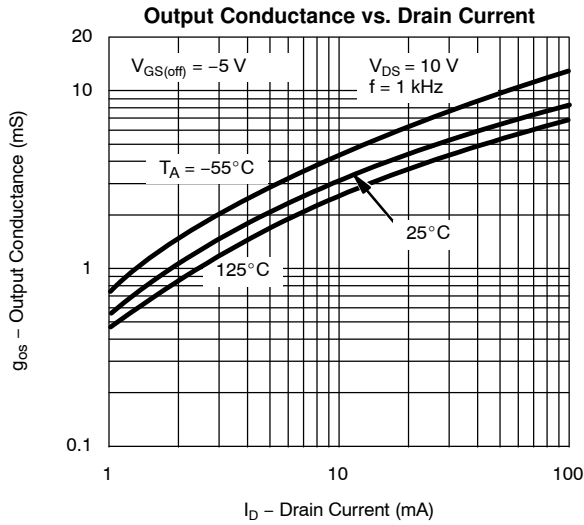




**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**



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



SWITCHING TIME TEST CIRCUIT		
	U290	U291
V <sub>GS(L)</sub>	-12 V	-7 V
R <sub>L</sub> *	50 Ω	50 Ω
I <sub>D(on)</sub>	28 mA	27 mA

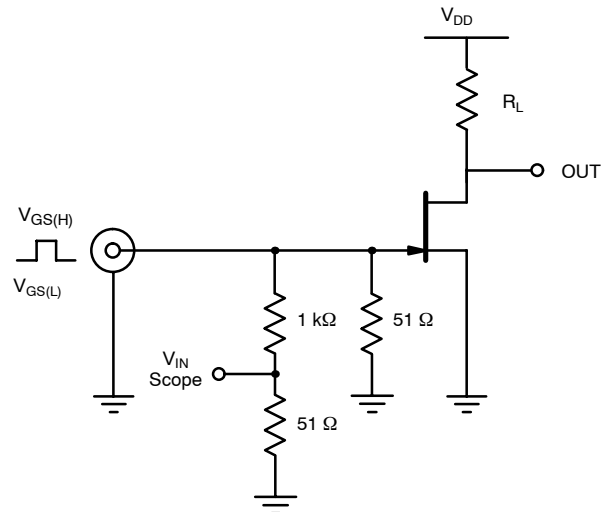
\* Non-Inductive

**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





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