

Model 304N/304P Impedance Converter with N-Channel JFET or P-Channel MOSFET



Model 304 Impedance Converter consists of a high megohm load resistor, a lower value output (source) resistor and a FET sealed into a standard TO-72 4-pin transistor housing.

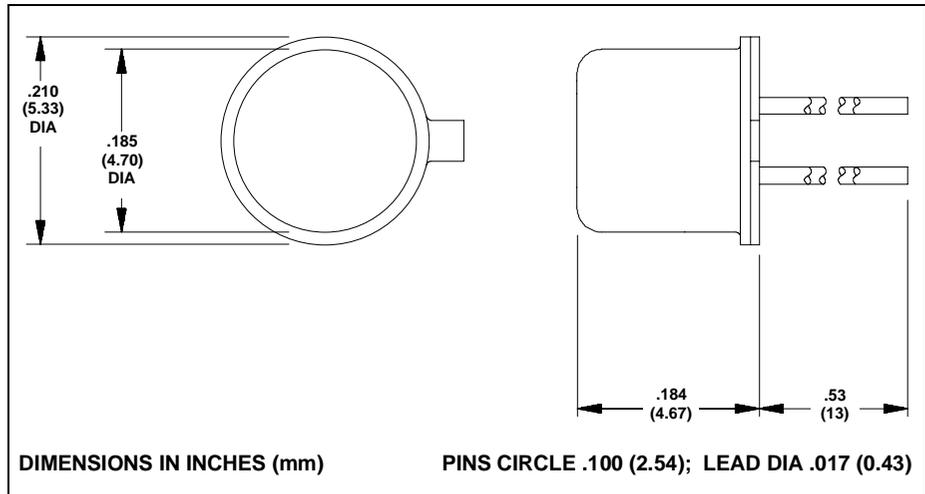
Resistor values and type of FET must be specified. Non-standard resistor values or tolerances may increase price or require a minimum quantity buy.

Model 304N contains an N-Channel JFET which exhibits very low noise at room temperature, but the signal will change with changes in temperature.

Model 304P contains a P-Channel MOSFET which exhibits relatively higher noise at room temperature, but the signal is little affected by temperature change.

The high megohm resistor forms a load for a very high impedance signal source such as various UV/Vis/IR detectors. This signal is applied to the gate of a very low I_G FET configured as a self-biasing source follower. The output signal is developed across the source resistor.

Typical FETs used give an output impedance of 20 k Ω , thus the name impedance converter.

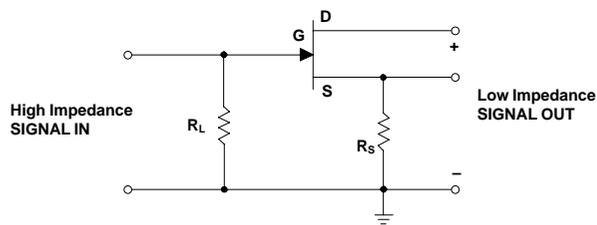


Characteristics	304N	Test Unit	Conditions
Pinch-off Voltage $V_{GS(off)}$ (max)	-1	V	
Breakdown Voltage BV_{GSS} (max)	-40	V	
Input Impedance (typ)	2×10^9	Ω	
Output Impedance (typ)	5	k Ω	
Noise (typ)	6	μ V rms	DC - 100 kHz @ 1V
Gate Reverse Current I_{GSS} (max)	0.1	nA	Rt
Operating Current (typ)	80	μ A	
Drain Current I_{DSS} (max)	0.6	mA	
Gain (typ)	0.7		
Operating Temperature	-55 to +125	$^{\circ}$ C	
Storage Temperature	-55 to +125	$^{\circ}$ C	

Characteristics	304P	Test Unit	Conditions
Threshold Voltage $V_{GS(th)}$ (max)	-5	V	
Breakdown Voltage BV_{GSS} (max)	-40	V	
Input Impedance (typ)	5×10^{11}	Ω	
Output Impedance (typ)	20	k Ω	
Noise (typ)	25	μ V rms	DC - 1 MHz @ 12V
Gate Reverse Current I_{GSS} (max)	-10	pA	Rt
Operating Current (typ)	-2.5	mA	$V_{DS} = V_{GS} - 12V$
Drain Current (max)	-50	mA	
Gain (typ)	0.95		
Operating Temperature	-55 to +125	$^{\circ}$ C	
Storage Temperature	-55 to +125	$^{\circ}$ C	

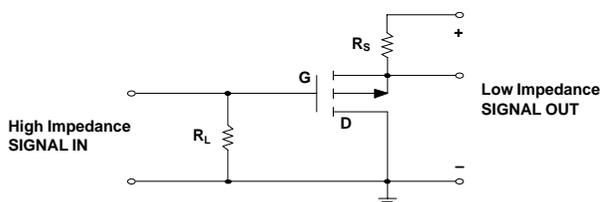
Characteristics at 25 $^{\circ}$ C unless otherwise stated.
Data is established on a sample basis and is believed to be representative.

Impedance Converter using an N-Channel JFET

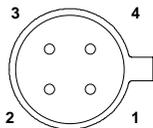


JFETs exhibit very low noise at room temperature. The gate reverse current I_{GSS} doubles with every 10°C increase in operating temperature. It decreases in the same ratio. The lowest operating temperature is approximately 73K or -200°C .

Impedance Converter using a P-Channel MOSFET



MOSFETs exhibit relatively higher noise at room temperature. The gate reverse current I_{GSS} does not change with temperature. The lowest operating temperature is 3K or -270°C .



BOTTOM VIEW

PIN	304N N-ch. JFET	304P P-ch. MOSFET
1	S	D
2	D	G
3	G	+
4	GND	S

Modifications and custom designs may be requested. Also, prototype models as well as large quantity production runs can be made to meet specific applications.

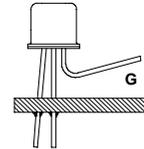
Also available is the Model 304PM9, which has an internal P-type MOSFET, a large impedance (1×10^{11}) load resistor in parallel with the FET and no source resistor. It is enclosed in an 8 pin, TO-5 transistor housing. The mounting socket for the Model 304PM9 is Model 937.

NOTICE: The information provided herein is believed to be reliable. However, ELTEC Instruments, Inc. assumes no responsibility for inaccuracies or omissions. Due to industry components being incorporated into ELTEC's devices and ELTEC continually striving for product improvement, specifications may change without notice.

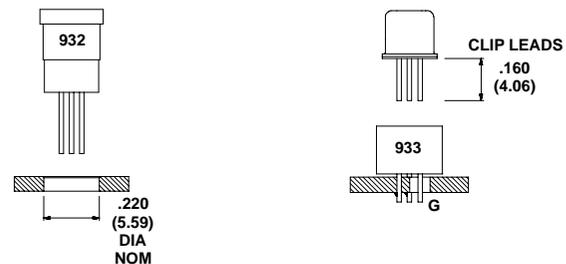
Gate Connection

The connection to the gate terminal is the most critical connection. At the gate, the signal is still a high impedance voltage signal. Care must be taken to ensure the connection to the gate is not influenced by noise or a relative low insulation resistance which would lower the input impedance and increase the noise of the impedance converter.

Three recommended mountings are shown. One mounting "floats" the gate lead and raises the other input leads off the PC board to prevent leakage currents.



Two mountings utilize ELTEC Teflon® sockets. The Model 932 Socket mounts through the PC board to maintain Teflon's® superior insulation properties. The Model 933 Socket mounts onto the board, but a larger diameter hole should be used for the gate lead to "float" the gate.



Terminal Connections

The following plug-in sockets are recommended:

- ELTEC Model 932 (Teflon®)
- ELTEC Model 933 (Teflon®)

Please specify:

- 1. Load Resistor:** Any ELTEC high megohm resistor value, up to $1 \times 10^{12}\Omega$. Non-standard values may increase price or require a minimum quantity buy.
- 2. Source Resistor:** Any standard resistor value and tolerance. Non-standard values may increase price or require a minimum quantity buy.
- 3. Transistor:** Specify either N-Channel JFET or P-Channel MOSFET and/or specific requirements.



ELTEC Instruments, Inc. P.O. Box 9610 Daytona Beach, Florida 32120-9610 U.S.A.
Tel (USA and Canada): (800) 874-7780 Tel (Outside USA): (386) 252-0411 Fax: (386) 258-3791
Web: www.eltecinstruments.com E-Mail: Sales@eltecinstruments.com