n-channel transducer/microphone preamplifiers

designed for . . .

■ **Hearing Aid Input Stages**

■ **High Impedance Transducer Buffer Amplifiers**
  Electret-Condenser
  Ceramic
  Piezo-Electric
 **Capacitive**
  Air Condenser

■ **Self-Biased General Purpose High Impedance Source Followers**

**Performance Curves
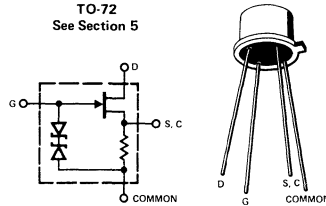NYFA NYFC See Section 4**

BENEFITS

● Complete Preamplifier, Requires No External Components
● Compact for Placement at Transducer
● Operates on Single Battery
● Ultra-High Input Impedance $5 \times 10^9 \, \Omega$ Typical
● Available in Chip Form for Hybrid Systems

TEST CONFIGURATION
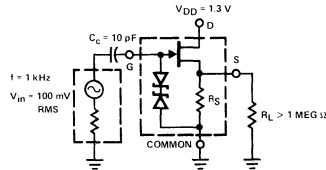
TO-72
See Section 5

ABSOLUTE MAXIMUM RATINGS (25°C)

Drain-Source and Drain-Gate Voltage . . . . 30 V
Gate Voltage (With Respect to Common) . . . . ±2.0 V
Forward Gate Current . . . . 1 mA
Total Device Dissipation (25°C Free-Air) . . . . 180 mW
Linear Derating Factor (to 85°C) . . . . . 3.0 mW/°C
Storage Temperature Range . . . . . . −55 to +150°C
Operating Temperature Range . . . . . −25 to +85°C
Lead Temperature (1/16″ from Case for 10 Sec.) . . 260°C

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

			T100			T300			Unit	TEST CONDITIONS All characteristics (unless otherwise specified) are measured in Test Configuration with $V_{in} = 100$ mV (RMS), f = 1 kHz, $C_c = 10$ pF, $V_{DD} = 1.3$ V, $R_L = 1$ MEG Ω
		Characteristic	Min	Typ	Max	Min	Typ	Max		
1	S T A T I C	BV_{DSS}	Drain-Source (Drain-Gate) Breakdown[1]	30			30			V	$I_D = 1 \, \mu$A, $V_{IN} = 0$, C_c Shorted
2		I_D	Operating Drain Current Range	10		50	70		350	μA	$V_{IN} = 0$, C_c Shorted
3		R_{in}	Input Resistance[2]	200M	5G		200M	5G		Ω	$V_{IN} = 100$ mV DC Measurement, C_c Shorted
4		R_{out}	Output Resistance	1500		3500	500		1300		$V_{IN} = 0$, C_c Shorted
5	D Y N A M I C	A_V	Voltage Gain		0.40	0.60		0.30	0.45	V/V	
6		THD	Total Harmonic Distortion		1.0			1.0		%	
7		e_{out}	Broadband Output Noise Voltage			4.0			2.0	μV	$V_{IN} = 0$, f = 10 Hz to 10 kHz, C_c Shorted
8		C_{in}	Input Capacitance		3.0	4.0		3.0	4.0	pF	V_{DD} 20 V, V_{IN} 0,
9		C_{out}	Output Capacitance		4.4	6.0		4.4	6.0		f = 1 MHz, C_c Shorted
			NYFC			NYFA				

NOTES:
1. Drain-Gate Breakdown Guaranteed by Drain-Source Breakdown Test.   2. $M = 10^6$, $G = 10^9$.

APPLICATIONS

Basic JFET Source Follower Equations are:

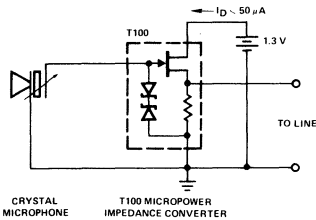$$I_D = I_{DSS} \left(1 - \frac{V_{GS}}{V_P}\right)^2 \quad (1)$$

$$R_{OUT} = \frac{R_S}{1 + g_{fs} R_S} \quad (4)$$
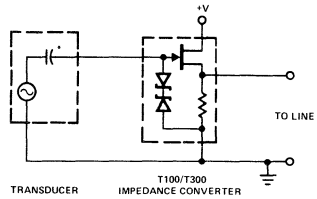
where $V_{GS} = -I_D R_S \quad (2)$

$$A_V = g_{fs} R_{OUT} \quad (5)$$

$$g_{fs} = \frac{-2\, I_{DSS}}{V_P} \left(\frac{I_D}{I_{DSS}}\right)^{\frac{1}{2}} \quad (3)$$

### T100 as a Micropower Preamplifier — As in a Hearing Aid Input

CRYSTAL MICROPHONE · T100 MICROPOWER IMPEDANCE CONVERTER

T100/T300 as an Impedance Converter for Transducer Input
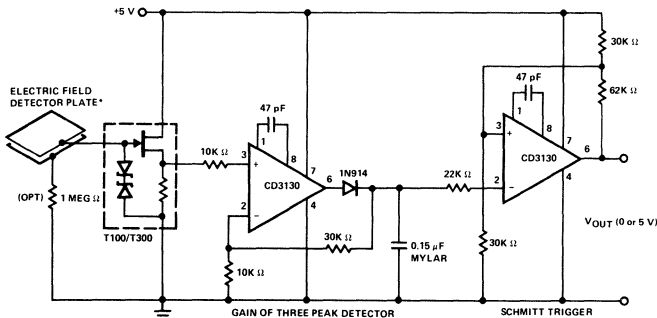

TRANSDUCER · IMPEDANCE CONVERTER

*NO CAPACITOR ISOLATION IS REQUIRED FOR CAPACITIVE TRANSDUCERS OR HIGH-IMPEDANCE PURE VOLTAGE SOURCES.

### T100/T300 as a Preamplifier in a Microphone Amplifier Circuit

ELECTRET MICROPHONE · T100/T300 IMPEDANCE CONVERTER · AUDIO AMPLIFIER (LM380 SHOWN)
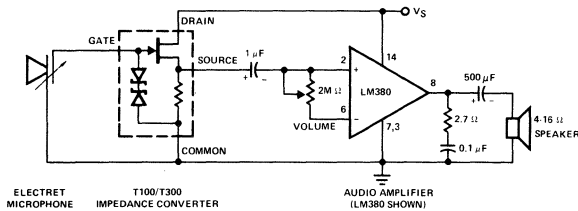
T100/T300 as a Self-Biased Proximity Sensor Works on Detected Changing Field

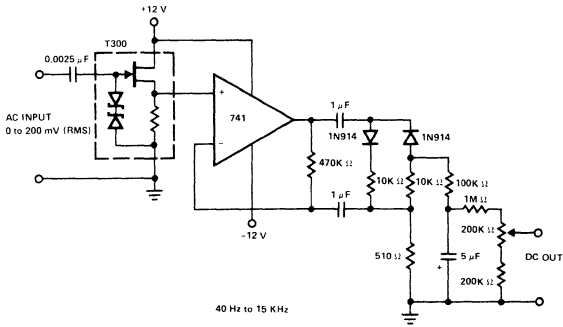GAIN OF THREE PEAK DETECTOR · SCHMITT TRIGGER

*DETECTOR PLATE MAY BE DOUBLE-SIDED PC BOARD OR ANY INSULATED METAL SHEET

APPLICATIONS (Cont'd)

T300's as Low Signal Level, High Impedance Instrumentation Amplifier

ZERO ADJUST

VARIABLE

HIGH IMPEDANCE BRIDGE

IMPEDANCE CONVERTER
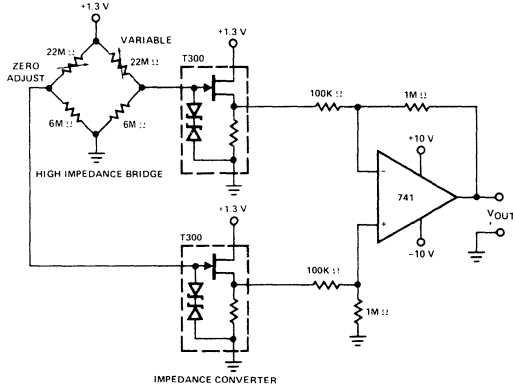
T100 in a High Impedance Precision Rectifier for AC/DC Converter

AC INPUT
0 to 200 mV (RMS)

40 Hz to 15 KHz

DC OUT

Source Follower with Voltage Gain Typically Greater Than 0.95 V/V and Z_{OUT} Typically Less Than 60 Ω

AC INPUT

AC OUTPUT

3