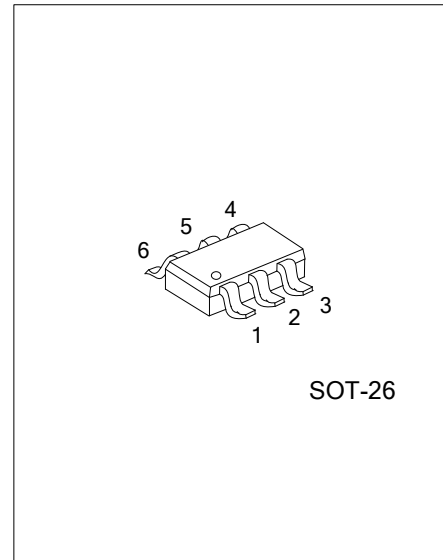




# ANALOG SERIES: PRE-AMPLIFIED IC'S FOR HIGH GAIN 2-WIRE MICROPHONES



### DESCRIPTION

The UTC **ULV1012** is high gain, high impedance pre-amplifier which is designed to replace the JFET amplifier currently being used. The UTC **ULV1012** audio amplifiers are specified to operate over a 2.2V to 5.0V supply voltage range with fixed gains of 7.8dB, 15.6dB, 20.9dB, and 23.8dB. The devices offer excellent THD, gain accuracy and temperature stability as compared to a JFET microphone.

The UTC **ULV1012** series is ideally suited for applications requiring high signal integrity in the presence of ambient or RF noise, such as in cellular communications.

The UTC **ULV1012** suited for use in headsets, mobile communications, automotive accessories, PDAs, accessory microphone products and telephone Electret Condenser Microphones (ECM).

### FEATURES

- \* Typical ULV1012-15, 2.2V Supply,  $R_L=2.2k\Omega$ ,  $C=2.2\mu F$ ,  $V_{IN}=18mV_{PP}$ , Unless Otherwise Specified
- \* Supply Voltage: 2V ~ 5V
- \* Supply Current: <180 $\mu A$
- \* Voltage Gain
  - ULV1012-07: 7.8dB
  - ULV1012-15: 15.6dB
  - ULV1012-20: 20.9dB
  - ULV1012-25: 23.8dB
- \* Temperature Range: -40°C~85°C

### ORDERING INFORMATION

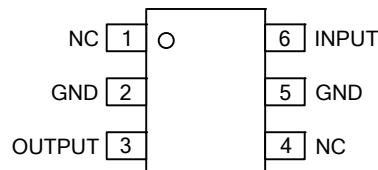
Ordering Number	Package	Packing
ULV1012G-xx-AG6-R	SOT-26	Tape Reel

ULV1012G-xx-AG6-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) AG6: SOT-26
	(3)Voltage Gain	(3) 07: 7.8dB, 15: 15.6dB, 20: 20.9dB, 25: 23.8dB
	(4)Green Package	(4) G: Halogen Free and Lead Free

■ MARKING INFORMATION

PACKAGE	VOLTAGE GAIN	MARKING
SOT-26	07: 7.8dB 15: 15.6dB 20: 20dB 25: 23.8dB	

■ PIN CONFIGURATION



Note: Pin numbers are referenced to package marking text orientation.

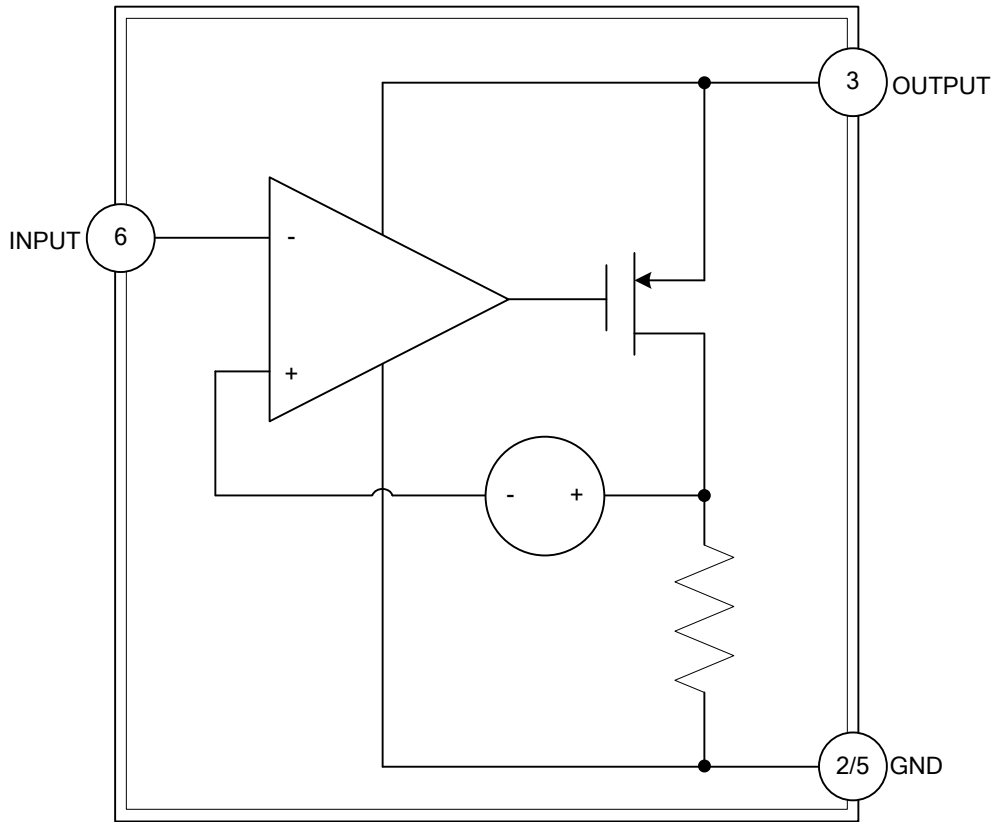
The actual physical placement of the package marking will vary slightly from part to part.

The package will designate the date code and will vary considerably. Package marking does not correlate to device type in any way.

■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1, 4	NC	
2, 5	GND	Ground
3	OUTPUT	Output Voltage
6	INPUT	Input Voltage

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING (Note 1)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>DD</sub> -GND	V <sub>DD</sub>	5.5	V
ESD Tolerance (Note 2)	Human Body Model	ESD	2500	V
	Machine Model		250	V
Junction Temperature (Note 3)		T <sub>J</sub>	150	°C
Storage Temperature Range		T <sub>STG</sub>	-65 ~ +150	°C
Mounting Temperature	Infrared or Convection (20 sec.)		235	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied. For ensured specifications and the test conditions, see the **5V Electrical Characteristics**.

2. Human Body Model (HBM) is 1.5kΩ in series with 100pF.

3. The maximum power dissipation is a function of T<sub>J(MAX)</sub>, θ<sub>JA</sub> and T<sub>A</sub>. The maximum allowable power dissipation at any ambient temperature is P<sub>D</sub>=(T<sub>J(MAX)</sub>-T<sub>A</sub>)/θ<sub>JA</sub>. All numbers apply for packages soldered directly into a PC board.

### ■ OPERATING RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>DD</sub>	2 ~ 5	V
Temperature Range	T <sub>J</sub>	-40 ~ +85	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied. For ensured specifications and the test conditions, see the **5V Electrical Characteristics**.

### ■ 2.2V ELECTRICAL CHARACTERISTICS (Note 1)

(Unless otherwise specified, all limits are specified for T<sub>J</sub>=25°C, V<sub>DD</sub>=2.2V, V<sub>IN</sub>=18mV, R<sub>L</sub>=2.2kΩ and C=2.2μF. **Boldface** limits apply at the temperature extremes.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 2)	TYP (Note 3)	MAX (Note 2)	UNIT	
Supply Current	I <sub>DD</sub>	V <sub>IN</sub> =GND	ULV1012-07		139	250	μA
			ULV1012-15		180	300	μA
			ULV1012-20		160	250	μA
			ULV1012-25		141	250	μA
							<b>300</b>
Signal To Noise Ratio	SNR	f=1kHz, V <sub>IN</sub> =18mV, A-Weighted	ULV1012-07		59		dB
			ULV1012-15		60		dB
			ULV1012-20		61		dB
			ULV1012-25		61		dB
Max Input Signal	V <sub>IN</sub>	f=1kHz and THD+N<1%	ULV1012-07		170		mV <sub>PP</sub>
			ULV1012-15		100		mV <sub>PP</sub>
			ULV1012-20		50		mV <sub>PP</sub>
			ULV1012-25		28		mV <sub>PP</sub>

### ■ 2.2V ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 2)	TYP (Note 3)	MAX (Note 2)	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=GND$	ULV1012-07	1.65	1.90	2.03	V
				<b>1.54</b>		<b>2.09</b>	V
			ULV1012-15	1.54	1.81	1.94	V
				<b>1.48</b>		<b>2.00</b>	V
			ULV1012-20	1.65	1.85	2.03	V
				<b>1.55</b>		<b>2.13</b>	V
			ULV1012-25	1.65	1.90	2.02	V
				<b>1.49</b>		<b>2.18</b>	V
Lower -3dB Roll Off Frequency	$f_{LOW}$	$R_{SOURCE}=50\Omega$		65		Hz	
Upper -3dB Roll Off Frequency	$f_{HIGH}$	$R_{SOURCE}=50\Omega$		95		kHz	
Output Noise	$e_n$	A-Weighted	ULV1012-07		-96		dBV
			ULV1012-15		-89		dBV
			ULV1012-20		-84		dBV
			ULV1012-25		-82		dBV
Total Harmonic Distortion	THD	$f=1kHz,$ $V_{IN}=18mV$	ULV1012-07		0.10		%
			ULV1012-15		0.09		%
			ULV1012-20		0.12		%
			ULV1012-25		0.15		%
Input Capacitance	$C_{IN}$			2		pF	
Input Impedance	$Z_{IN}$			>1000		GΩ	
Gain	$A_V$	$f=1kHz,$ $R_{SOURCE}=50\Omega$	ULV1012-07	6.4	7.8	9.5	dB
				<b>5.5</b>		<b>10.0</b>	dB
			ULV1012-15	14.0	15.6	16.9	dB
				<b>13.1</b>		<b>17.5</b>	dB
			ULV1012-20	19.5	20.9	22.0	dB
				<b>17.4</b>		<b>23.3</b>	dB
			ULV1012-25	22.5	23.8	25.0	dB
				<b>21.4</b>		<b>25.7</b>	dB

- Notes: 1. Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that  $T_J=T_A$ . No specification of parametric performance is indicated in the electrical tables under conditions of internal self-heating where  $T_J>T_A$ .
2. All limits are specified by design or statistical analysis.
3. Typical values represent the most likely parametric norm.

### ■ 5V ELECTRICAL CHARACTERISTICS (Note 1)

(Unless otherwise specified, all limits are specified for  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=5\text{V}$ ,  $V_{IN}=18\text{mV}$ ,  $R_L=2.2\text{k}\Omega$  and  $C=2.2\mu\text{F}$ . **Boldface** limits apply at the temperature extremes.)

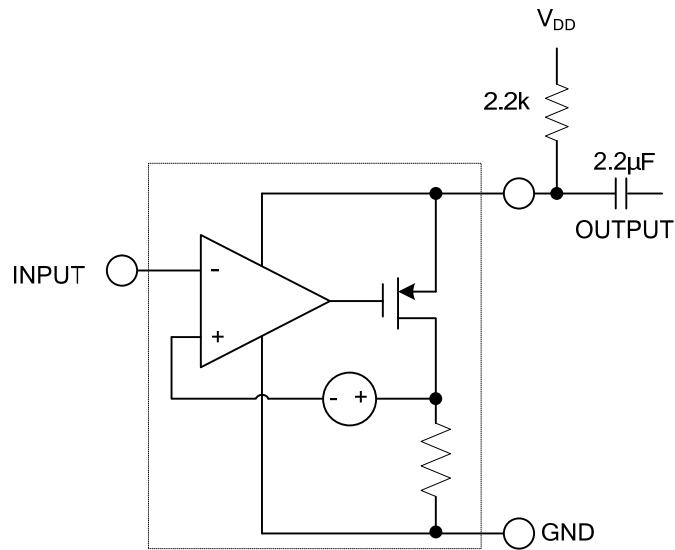
PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 2)	TYP (Note 3)	MAX (Note 2)	UNIT	
Supply Current	$I_{DD}$	$V_{IN}=\text{GND}$	ULV1012-07		158	250	$\mu\text{A}$
						<b>300</b>	$\mu\text{A}$
			ULV1012-15		200	300	$\mu\text{A}$
						<b>325</b>	$\mu\text{A}$
			ULV1012-20		188	260	$\mu\text{A}$
					<b>310</b>	$\mu\text{A}$	
				160	250	$\mu\text{A}$	
					<b>300</b>	$\mu\text{A}$	
Signal To Noise Ratio	SNR	$f=1\text{kHz}$ , $V_{IN}=18\text{mV}$ , A-Weighted	ULV1012-07		59		dB
			ULV1012-15		60		dB
			ULV1012-20		61		dB
			ULV1012-25		61		dB
Max Input Signal	$V_{IN}$	$f=1\text{kHz}$ and $\text{THD}+\text{N}<1\%$	ULV1012-07		170		$\text{mV}_{PP}$
			ULV1012-15		100		$\text{mV}_{PP}$
			ULV1012-20		55		$\text{mV}_{PP}$
			ULV1012-25		28		$\text{mV}_{PP}$
Output Voltage	$V_{OUT}$	$V_{IN}=\text{GND}$	ULV1012-07	4.45	4.65	4.80	V
				<b>4.38</b>		<b>4.85</b>	V
			ULV1012-15	4.34	4.56	4.74	V
				<b>4.28</b>		<b>4.80</b>	V
			ULV1012-20	4.40	4.58	4.75	V
				<b>4.30</b>		<b>4.85</b>	V
			ULV1012-25	4.45	4.65	4.83	V
				<b>4.39</b>		<b>4.86</b>	V
Lower -3dB Roll Off Frequency	$f_{LOW}$	$R_{SOURCE}=50\Omega$		67		Hz	
Upper -3dB Roll Off Frequency	$f_{HIGH}$	$R_{SOURCE}=50\Omega$		150		kHz	
Output Noise	$e_n$	A-Weighted	ULV1012-07		-96		dBV
			ULV1012-15		-89		dBV
			ULV1012-20		-84		dBV
			ULV1012-25		-82		dBV
Total Harmonic Distortion	THD	$f=1\text{kHz}$ , $V_{IN}=18\text{mV}$	ULV1012-07		0.12		%
			ULV1012-15		0.13		%
			ULV1012-20		0.18		%
			ULV1012-25		0.21		%
Input Capacitance	$C_{IN}$			2		pF	
Input Impedance	$Z_{IN}$			>1000		$\text{G}\Omega$	
Gain	$A_V$	$f=1\text{kHz}$ , $R_{SOURCE}=50\Omega$	ULV1012-07	6.4	8.1	9.5	dB
				<b>5.5</b>		<b>10.7</b>	dB
			ULV1012-15	14.0	15.6	16.9	dB
				<b>13.1</b>		<b>17.5</b>	dB
			ULV1012-20	19.2	21.1	22.3	dB
				<b>17.0</b>		<b>23.5</b>	dB
			ULV1012-25	22.5	23.9	25.0	dB
				<b>21.2</b>		<b>25.8</b>	dB

Notes: 1. Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that  $T_J=T_A$ . No specification of parametric performance is indicated in the electrical tables under conditions of internal self-heating where  $T_J>T_A$ .

2. All limits are specified by design or statistical analysis.

3. Typical values represent the most likely parametric norm.

■ TYPICAL APPLICATION CIRCUIT



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