



ULV1012

Preliminary

CMOS IC

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).

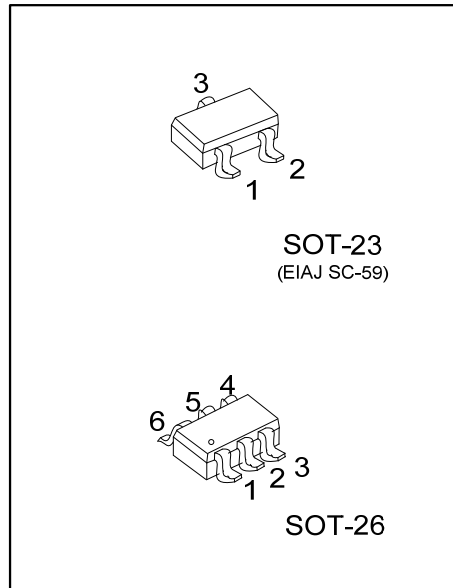
FEATURES

- * 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 μA
- * 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
Lead Free	Halogen Free		
ULV1012L-xx-AE3-R	ULV1012G-xx-AE3-R	SOT-23	Tape Reel
ULV1012L-xx-AG6-R	ULV1012G-xx-AG6-R	SOT-26	Tape Reel

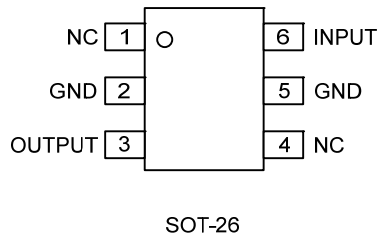
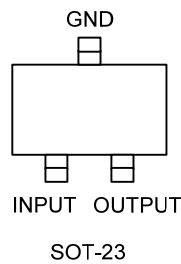
ULV1012G-xx-AE3-R 	(1) R: Tape Reel (2) AG6: SOT-26 (3) 07: 7.8dB, 15: 15.6dB, 20: 20.9dB, 25: 23.8dB (4) G: Halogen Free and Lead Free, L: Lead Free
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MARKING INFORMATION

PACKAGE	VOLTAGE GAIN	MARKING
SOT-23	07: 7.8dB 15: 15.6dB 20: 20dB 25: 23.8dB	
SOT-26		

PIN CONFIGURATION



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

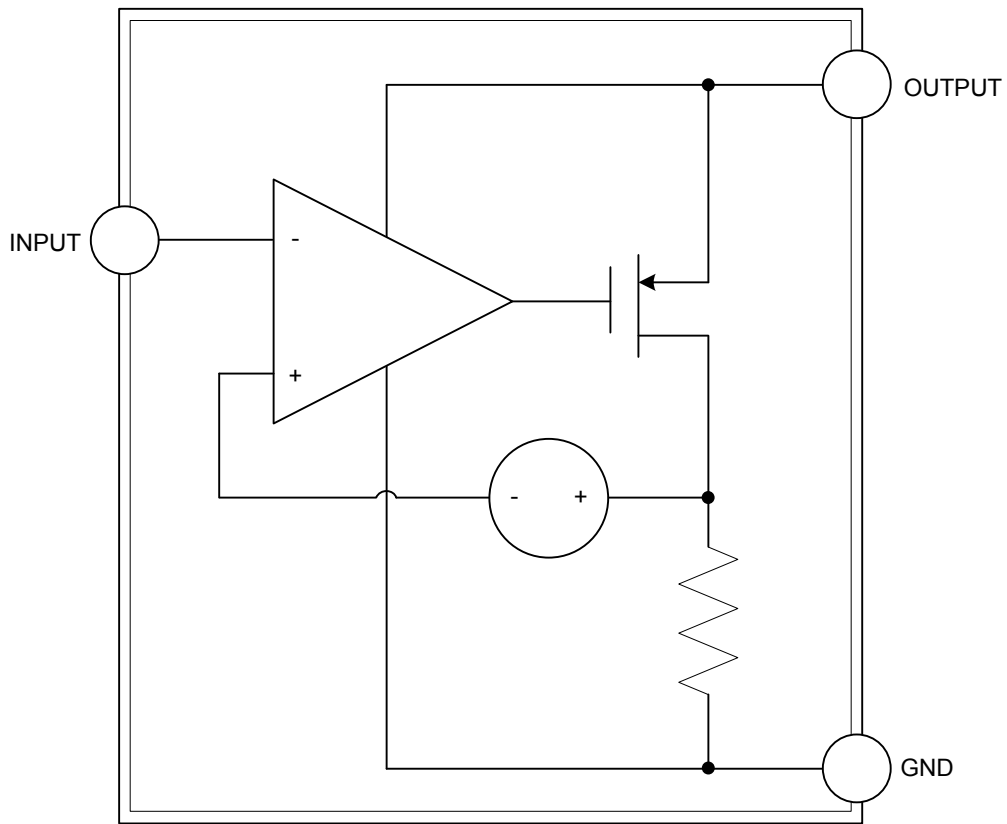
The actual physical placement of the package marking will vary slightly from part to part.

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
SOT-23	SOT-26		
1	6	INPUT	Input Voltage
2	3	OUTPUT	Output Voltage
3	2, 5	GND	Ground
-	1, 4	NC	No Connection

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Note 1)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage	V _{DD-GND}	V _{DD}	5.5	V
ESD Tolerance (Note 2)	Human Body Model	ESD	2500	V
	Machine Model		250	V
Junction Temperature (Note 3)		T _J	+150	°C
Storage Temperature Range		T _{STG}	-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_{J(MAX)}, θ_{JA} and T_A. The maximum allowable power dissipation at any ambient temperature is P_D=(T_{J(MAX)}-T_A)/θ_{JA}. All numbers apply for packages soldered directly into a PC board.

■ OPERATING RATING

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V _{DD}	2 ~ 5	V
Temperature Range		T _J	-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_J=25°C, V_{DD}=2.2V, V_{IN}=18mV, R_L=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 _{DD}	V _{IN} =GND	ULV1012-07		139	250	μA
			ULV1012-15		300	μA	
			ULV1012-20		180	300	μA
			ULV1012-25		325	μA	
			ULV1012-25		160	250	μA
Signal To Noise Ratio	SNR	f=1kHz, V _{IN} =18mV, A-Weighted	ULV1012-07		59		dB
			ULV1012-15		60		dB
			ULV1012-20		61		dB
			ULV1012-25		61		dB
Max Input Signal	V _{IN}	f=1kHz and THD+N<1%	ULV1012-07		170		mV _{PP}
			ULV1012-15		100		mV _{PP}
			ULV1012-20		50		mV _{PP}
			ULV1012-25		28		mV _{PP}

■ 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
				1.54		2.09	V
			ULV1012-15	1.54	1.81	1.94	V
				1.48		2.00	V
			ULV1012-20	1.65	1.85	2.03	V
		1.55		2.13	V		
ULV1012-25	1.65	1.90	2.02	V			
		1.49		2.18	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
				5.5		10.0	dB
			ULV1012-15	14.0	15.6	16.9	dB
				13.1		17.5	dB
			ULV1012-20	19.5	20.9	22.0	dB
				17.4		23.3	dB
			ULV1012-25	22.5	23.8	25.0	dB
				21.4		25.7	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.)

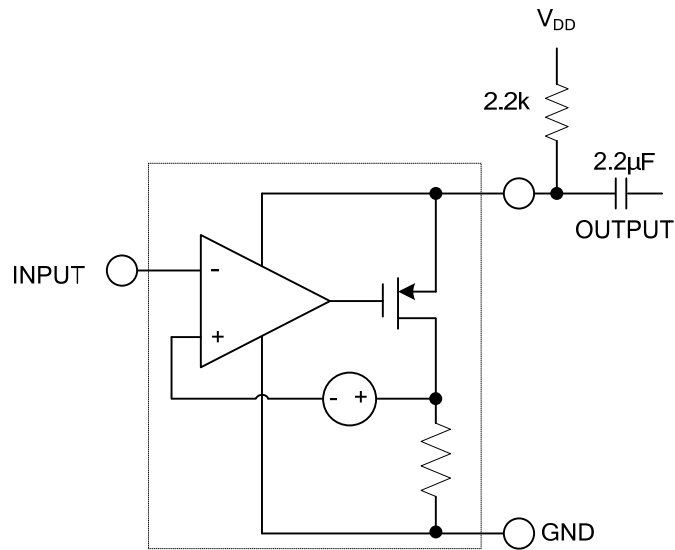
PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 2)	TYP (Note 3)	MAX (Note 2)	UNIT	
Supply Current	I_{DD}	$V_{IN}=\text{GND}$	ULV1012-07		158	250	μA
						300	μA
			ULV1012-15		200	300	μA
						325	μA
			ULV1012-20		188	260	μA
					310	μA	
				160	250	μA	
					300	μA	
Signal To Noise Ratio	SNR	$f=1\text{kHz}$, $V_{IN}=18\text{mV}$, 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		mV_{PP}
			ULV1012-15		100		mV_{PP}
			ULV1012-20		55		mV_{PP}
			ULV1012-25		28		mV_{PP}
Output Voltage	V_{OUT}	$V_{IN}=\text{GND}$	ULV1012-07	4.45	4.65	4.80	V
				4.38		4.85	V
			ULV1012-15	4.34	4.56	4.74	V
				4.28		4.80	V
			ULV1012-20	4.40	4.58	4.75	V
				4.30		4.85	V
			ULV1012-25	4.45	4.65	4.83	V
				4.39		4.86	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
				5.5		10.7	dB
			ULV1012-15	14.0	15.6	16.9	dB
				13.1		17.5	dB
			ULV1012-20	19.2	21.1	22.3	dB
				17.0		23.5	dB
			ULV1012-25	22.5	23.9	25.0	dB
				21.2		25.8	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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