



# ULV2362

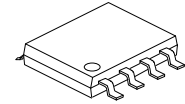
Preliminary

CMOS IC

## HIGH-PERFORMANCE LOW-VOLTAGE OPERATIONAL AMPLIFIERS

### DESCRIPTION

The UTC **ULV2362** is a high-performance dual operational amplifier. This device can be operated at a very low supply voltage ( $\pm 1V$ ), while maintaining a wide output swing. The UTC **ULV2362** offers a dramatically improved dynamic range of signal conditioning in low-voltage system. The UTC **ULV2362** also provides higher performance than other general-purpose operational amplifier by combining higher unity-gain bandwidth and faster slew rate. With its low distortion and low-noise performance, it is well suited for audio applications.



SOP-8

### FEATURES

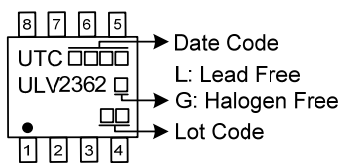
- \* Low Supply-Voltage Operation:  $V_{CC} = \pm 1V$  (Min.)
- \* Wide Bandwidth: 7MHz (Typ.) at  $V_{CC} = \pm 2.5V$
- \* High Slew Rate:  $3V/\mu s$  (Typ.) at  $V_{CC} = \pm 2.5V$
- \* Low Noise:  $8nV/\sqrt{Hz}$  (Typ.) at  $f = 1kHz$
- \* Wide Output Voltage Swing:  $\pm 2.4V$  (Typ.) at  $V_{CC} = \pm 2.5V$ ,  $R_L = 10k\Omega$

### ORDERING INFORMATION

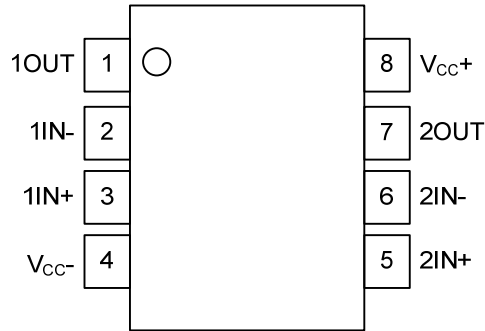
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV2362L-S08-R	ULV2362G-S08-R	SOP-8	Tape Reel

<p>ULV2362G-S08-R</p> <pre>                 (1)Packing Type                 (2)Package Type                 (3)Green Package           </pre>	<p>(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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### MARKING



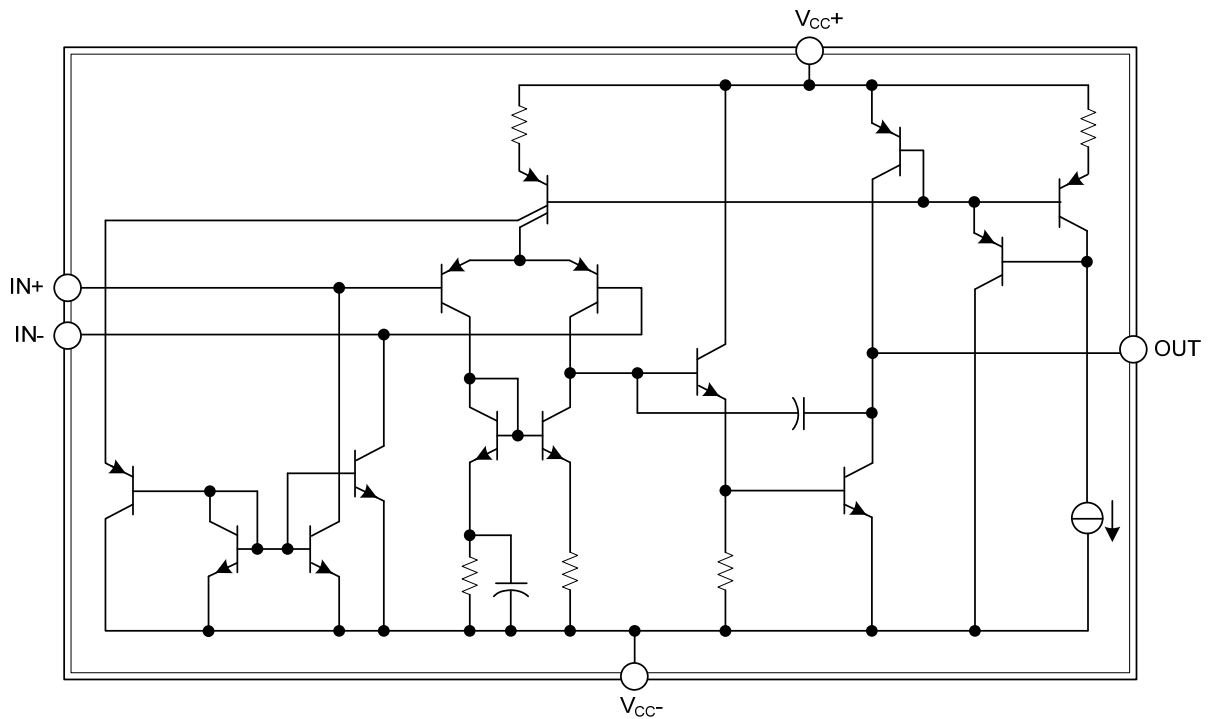
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	1OUT	Channel one output
2	1IN-	Negative channel one input
3	1IN+	Positive channel one input
4	V <sub>CC-</sub>	The lowest voltage
5	2IN+	Positive channel two input
6	2IN-	Negative channel two input
7	2OUT	Channel two output
8	V <sub>CC+</sub>	Supply Voltage

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (Note 2)	$V_{CC+}$	3.5	V
	$V_{CC-}$	-3.5	V
Differential Input Voltage (Note 3)	$V_{ID}$	$\pm 3.5$	V
Input Voltage (any input) (Notes 2, 4)	$V_I$	$\pm V_{CC}$	V
Output Voltage	$V_O$	$\pm 3.5$	V
Output Current	$I_O$	20	mA
Operating Virtual Junction Temperature	$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 ~ +150	$^{\circ}\text{C}$

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.

2. All voltage values, except differential voltages, are with respect to the midpoint between  $V_{CC+}$  and  $V_{CC-}$ .
3. Differential voltages are at  $IN+$  with respect to  $IN-$ .
4. All input voltage values must not exceed  $V_{CC}$ .

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	$\pm 1 \sim \pm 2.5$	V
Operating Free Air Temperature	$T_A$	-40 ~ +85	$^{\circ}\text{C}$

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	97	$^{\circ}\text{C}/\text{W}$

### ■ ELECTRICAL CHARACTERISTICS ( $V_{CC}=\pm 1.5\text{V}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{IO}$	$V_O=0, V_{IC}=0$		1	6	mV
Input Offset Current	$I_{IO}$	$V_O=0, V_{IC}=0$		5	100	nA
Input Bias Current	$I_{IB}$	$V_O=0, V_{IC}=0$		20	150	nA
Common-Mode Input Voltage	$V_{IC}$	$ V_{IO}  \leq 7.5\text{mV}$	$\pm 0.5$			V
Maximum Positive-Peak Output Voltage	$V_{OM+}$	$R_L=10\text{k}\Omega$	1.2	1.4		V
Maximum Negative-Peak Output Voltage	$V_{OM-}$	$R_L=10\text{k}\Omega$	-1.2	-1.4		V
Supply Current (Per Amplifier)	$I_{CC}$	$V_O=0$ , No load		2.5	4	mA
Large-Signal Differential Voltage Amplification	$A_{VD}$	$V_O=\pm 1\text{V}, R_L=10\text{k}\Omega$		55		dB
Common-Mode Rejection Ratio	CMRR	$V_{IC}=\pm 0.5\text{V}$		75		dB
Supply-Voltage Rejection Ratio	$k_{SVR}$	$V_{CC}=\pm 1.5\text{V} \sim \pm 2.5\text{V}$		80		dB

### ■ ELECTRICAL CHARACTERISTICS ( $V_{CC}=\pm 2.5V$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{IO}$	$V_O=0, V_{IC}=0$		1	6	mV
Input Offset Current	$I_{IO}$	$V_O=0, V_{IC}=0$		5	100	nA
Input Bias Current	$I_{IB}$	$V_O=0, V_{IC}=0$		20	150	nA
Common-Mode Input Voltage	$V_{IC}$	$ V_{IO}  \leq 7.5mV$	$\pm 1.5$			V
Maximum Positive-Peak Output Voltage	$V_{OM+}$	$R_L=10k\Omega$	2	2.4		V
Maximum Negative-Peak Output Voltage	$V_{OM-}$	$R_L=10k\Omega$	-2	-2.4		V
Supply Current (Per Amplifier)	$I_{CC}$	$V_O=0$ , No load		2.5	5	mA
Large-Signal Differential Voltage Amplification	$A_{VD}$	$V_O=\pm 1V, R_L=10k\Omega$		60		dB
Common-Mode Rejection Ratio	CMRR	$V_{IC}=\pm 0.5V$		85		dB
Supply-Voltage Rejection Ratio	$k_{SVR}$	$V_{CC}=\pm 1.5V \sim \pm 2.5V$		80		dB

### ■ OPERATING CHARACTERISTICS

$V_{CC}=\pm 1.5V, T_A=25^\circ C$

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Slew Rate	SR	$A_V=1, V_I=\pm 0.5V$		2.5		V/ $\mu s$
Unity-Gain Bandwidth	$B_1$	$A_V=40, R_L=10k\Omega, C_L=100pF$		6		MHz
Equivalent Input Noise Voltage	$V_n$	$R_S=100\Omega, R_F=10k\Omega, f=1kHz$		9		nV/ $\sqrt{Hz}$

$V_{CC}=\pm 2.5V, T_A=25^\circ C$

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Slew Rate	SR	$A_V=1, V_I=\pm 0.5V$		3		V/ $\mu s$
Unity-Gain Bandwidth	$B_1$	$A_V=40, R_L=10k\Omega, C_L=100pF$		7		MHz
Equivalent Input Noise Voltage	$V_n$	$R_S=100\Omega, R_F=10k\Omega, f=1kHz$		8		nV/ $\sqrt{Hz}$
Total Harmonic Distortion, Plus Noise	THD+N	$A_V=1, V_O=\pm 1.2V, R_L=10k\Omega, f=3kHz$		0.004		%

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