



## ULV6002

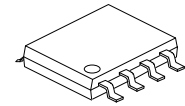
CMOS IC

### LOW POWER RAIL TO RAIL INPUT / OUTPUT DUAL OP AMP

#### DESCRIPTION

The UTC **ULV6002** of operational amplifiers (op amps) with low operational voltage (1.8V, min.) is specifically designed for general-purpose applications. This amplifier will draw 150 $\mu$ A (typ.) quiescent current when the single supply voltage is as low as 1.8V. It also has a power supply range of 1.8V to 5.5V. Additionally, the UTC **ULV6002** supports rail-to-rail input and output swing, with a common mode input voltage range of  $V_{DD} + 300mV$  to  $V_{SS} - 300mV$ .

The UTC **ULV6002** is available in the industrial and extended temperature ranges.



SOP-8

#### FEATURES

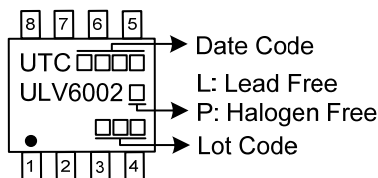
- \* Supply Voltage: 1.8~5.5V
- \* Supply Current/Amplifier: 315 $\mu$ A (Max.)
- \* Input Offset Voltage: 7mV (Max.)
- \* Rail-to-Rail Input and Output
- \* Slew Rate: 1.1V/ $\mu$ s (Typ.)

#### ORDERING INFORMATION

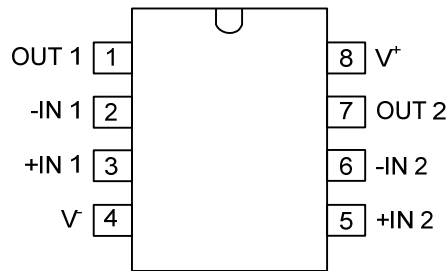
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV6002L-S08-R	ULV6002G-S08-R	SOP-8	Tape Reel

<p>ULV6002G-S08-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



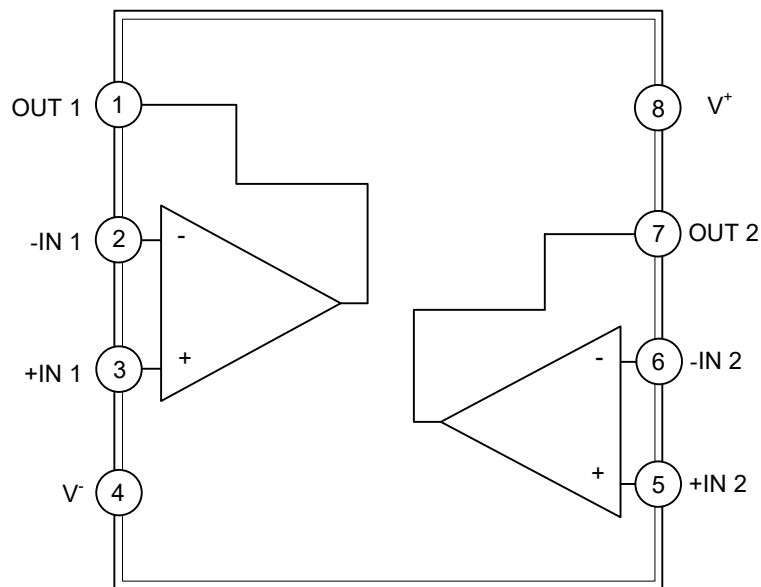
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT 1	Output of 1 AMP
2	-IN 1	Inverting Input of 1 AMP
3	+IN 1	Non-inverting input of 1 AMP
4	V <sup>-</sup>	Negative power supply
5	+IN 2	Non-inverting input of 2 AMP
6	-IN 2	Inverting input of 2 AMP
7	OUT 2	Output of 2 AMP
8	V <sup>+</sup>	Positive power supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage, $V^+$ to $V^-$	$V_S$	7	V
Input Common Mode Voltage Range	$V_{CM}$	$V^- -0.3 \sim V^+ +0.3$	V
Junction Temperature	$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 ~ +150	$^{\circ}\text{C}$

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.

■ RECOMMENDED OPERATING CONDITIONS

Over operating free-air temperature range (Unless otherwise specified)

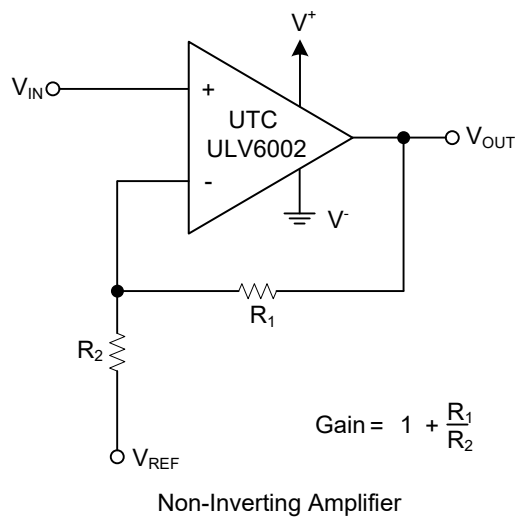
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	$V^+ - V^-$	1.8		5.5	V
Operating Free-Air Temperature	$T_{OPR}$	-40		+125	$^{\circ}\text{C}$

■ ELECTRICAL CHARACTERISTICS

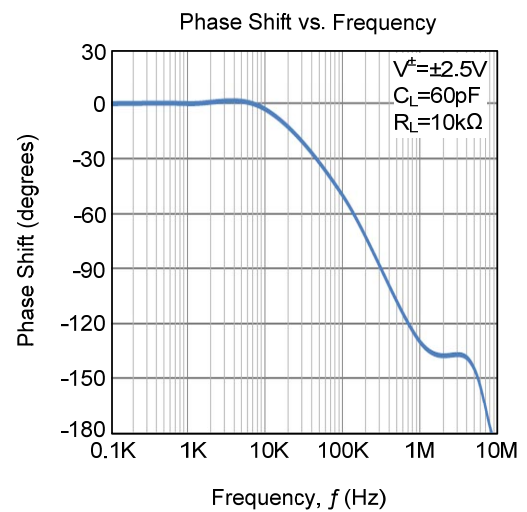
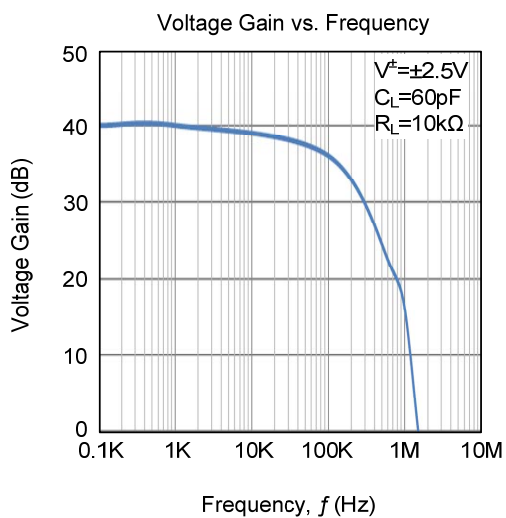
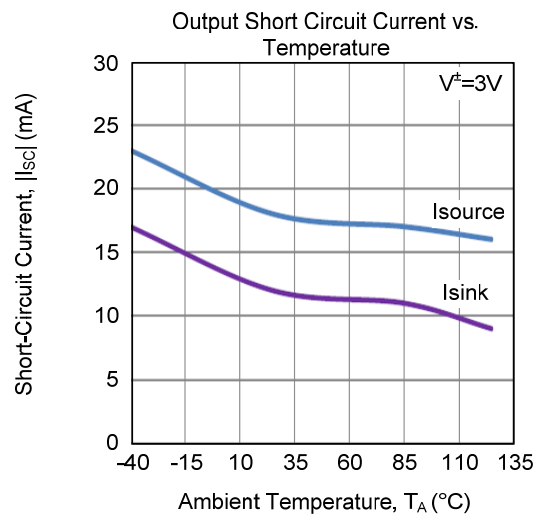
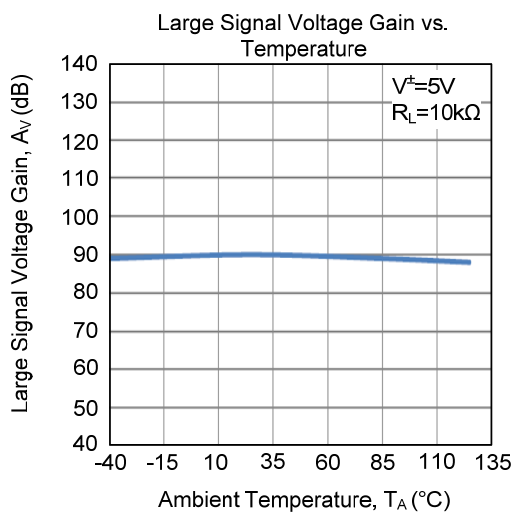
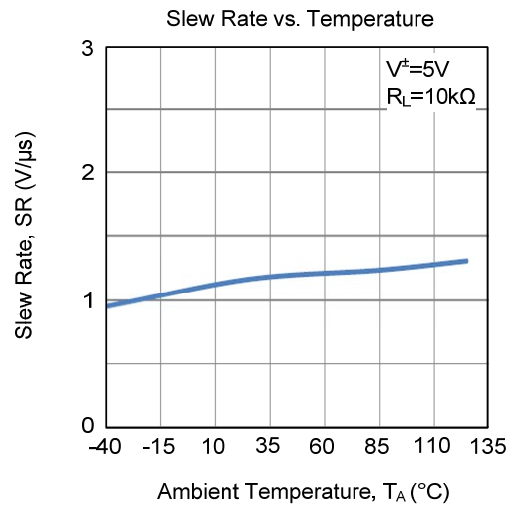
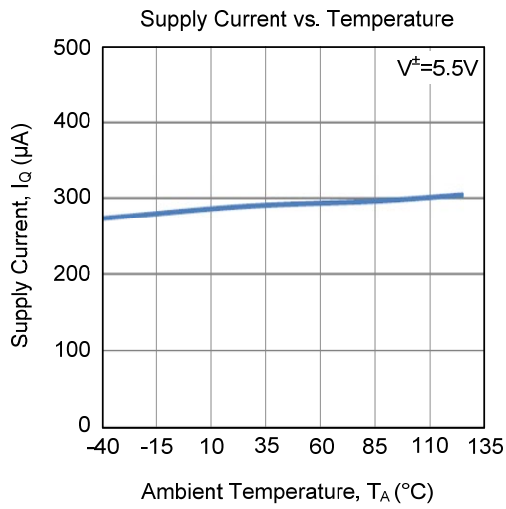
( $V_S=+1.8\text{V}\sim+5.5\text{V}$ ,  $V_{CM}=V_S/2$ ,  $R_L=10\text{k}\Omega$ , and  $V_{OUT} \approx V_S/2$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current/Amplifier	$I_Q$	$I_O=0$ , $V_S=5.5\text{V}$		160	315	$\mu\text{A}$
Power Supply Rejection Ratio	PSRR	$V_{CM}=V^-$		76		dB
Input Offset Voltage	$V_{OS}$				7	mV
Input Bias Current	$I_B$			$\pm 1.0$		pA
Input Offset Current	$I_{OS}$			$\pm 1.0$		pA
Common-Mode Voltage Range	$V_{CM}$		$V^- -0.3$		$V^+ +0.3$	V
Common-Mode Rejection Ratio	CMRR	$V_{CM}=-0.3\text{V}\sim 5.3\text{V}$ , $V^+=5\text{V}$	60	76		dB
Large Signal Voltage Gain	$A_V$	$V_O=0.3\text{V}\sim V^+ -0.3\text{V}$	80			dB
Output Voltage	$V_O$	$R_L=10\text{k}\Omega$	$V_{OH}$	$V^+ -0.1$		V
			$V_{OL}$			$V^- +0.1$
Short-Circuit Current	$I_{SC}$	Sourcing		18		mA
		Sinking		12		mA
Slew Rate	SR			1.1		V/ $\mu\text{s}$
Gain-Bandwidth Product	GBW			1.5		MHz
Input Voltage Noise Density	$e_n$	$f=1\text{kHz}$		30		$\frac{\text{nV}}{\sqrt{\text{Hz}}}$

■ TYPICAL APPLICATION CIRCUIT



■ TYPICAL CHARACTERISTICS



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