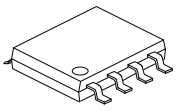
ULV602

CMOS IC

RAIL-TO-RAIL OUTPUT DUAL CMOS OP AMPS



SOP-8

■ DESCRIPTION

The UTC **ULV602** family of low-power operational amplifier (op amps) is offered in dual configurations. The op amps utilize an advanced CMOS technology that provides low bias current, high-speed operation, high open-loop gain, and rail-to-rail output swing. This product offering operates with a single supply voltage that can be as low as 2.7V, while drawing 200μA (typical) of quiescent current per amplifier. In addition, the common mode input voltage range goes 0.3V below ground, making these amplifiers ideal for single-supply operation.

The device is appropriate for low power, battery operated circuits due to the low quiescent current, for A/D convert driver amplifiers because of their wide bandwidth or for anti-aliasing filters by virtue of their low input bias current.

■ FEATURES

* Supply Voltage: 2.7V ~ 6.0V
* Supply Current: 200μA/amplifier (Typical)
* Input Offset Voltage: 2mV (Max.)
* Rail-to-Rail Output
* Slew Rate: 2.3V/μs (Typ.)

■ ORDERING INFORMATION

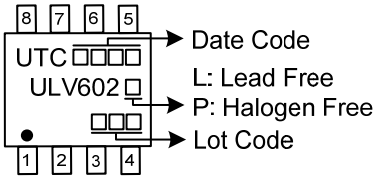
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV602L-S08-R	ULV602G-S08-R	SOP-8	Tape Reel

ULV602G-S08-R

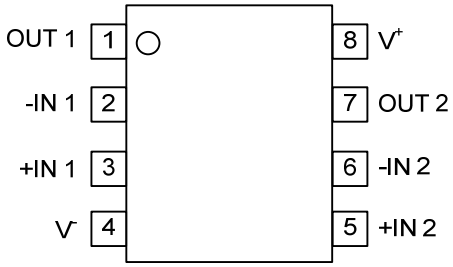
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) S08: SOP-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



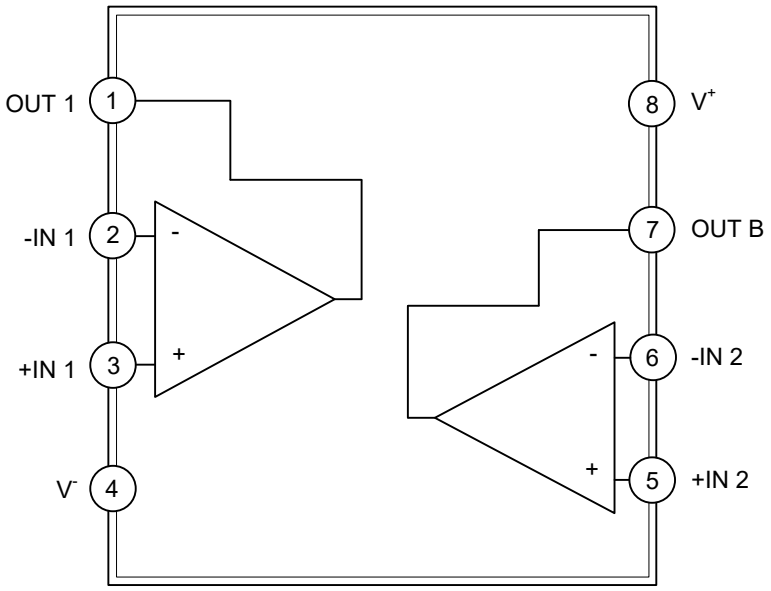
■ PIN CONFIGURATION



■ 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^-	Negative Power Supply
5	+IN 2	Non-inverting input of 2 AMP
6	-IN 2	Non-inverting input of 2 AMP
7	OUT 2	Output of 2 AMP
8	V^+	Positive Power Supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Power Supply	V^+ - V^-	7.0	V
Difference Input Voltage		| V+ - V-|	V
Current at Output and Supply Pins		±30	mA
Current at Input Pins	I_{IN}	±2	mA
Analog Inputs (V_{IN}+, V_{IN}-)		V^- -1.0 ~ V^+ +1.0	V
All Other Inputs and Outputs		V^- -0.3 ~ V^+ +0.3	V
Maximum Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-65 ~ +150	°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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Thermal Resistance	θ_{JA}	125	°C/W

■ RECOMMENDED OPWRAING CONDITIONS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_+ - V-	2.7 ~ 6.0	V
Operating Free-Air Temperature	T_{OPR}	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

(T_A =25°C, V_+ =+2.7 ~ +5.5V, R_L=100kΩ, V_{CM} = V_+/2, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current/Amplifier	IQ	I_O=0		200	325	μA
Power Supply Rejection Ratio	PSRR	V+ = 2.7V ~ 5.5V	76	120		dB
Input Offset Voltage	V_{OS}		-2	±0.7	+2	mV
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta_T$	T_A = -40°C to +125°C		±2.5		μV/°C
Input Bias Current	I_B			1		pA
Input Offset Current	I_{OS}			±1		pA
Common-Mode Voltage Range	V_{CM}		V^--0.3		V^+-1.2	V
Common-Mode Rejection Ratio	CMRR	V_{CM}=-0.3V~3.8V, V^+=5.0V	75	90		dB
Large Signal Voltage Gain	A_V	R_L = 25kΩ V_{OUT}=0.1V~ V^-- 0.1V	85	105		dB
		R_L = 5kΩ V_{OUT}=0.1V~ V^-- 0.1V	80	100		dB
Output Voltage	V_O	R_L = 25kΩ, A_{OL} ≥ 100dB	V^-+100		V^+-100	mV
		R_L = 5kΩ, A_{OL} ≥ 95dB	V^-+100		V^+-100	mV
Short-Circuit Current	ISC	Sourcing, VO=0V		25		mA
		Sinking, VO= V+		20		mA
Slew Rate	SR			2.3		V/μs
Gain-Bandwidth Product	GBW			2.8		MHz
Phase Margin	ΦM			25		degrees
Voltage Noise Density	en	f=1kHz		32		nV/$\sqrt{Hz}$
		f=10kHz		23		nV/$\sqrt{Hz}$

■ TEST CIRCUITS

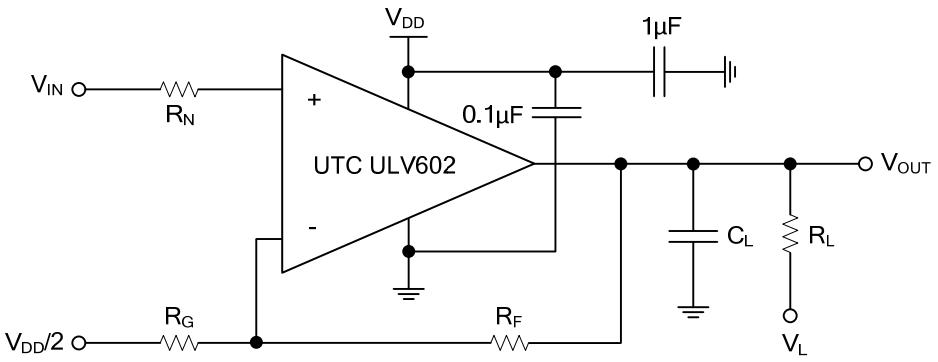


Figure 1. AC and DC Test Circuit for Most Non-Inverting Gain Conditions.

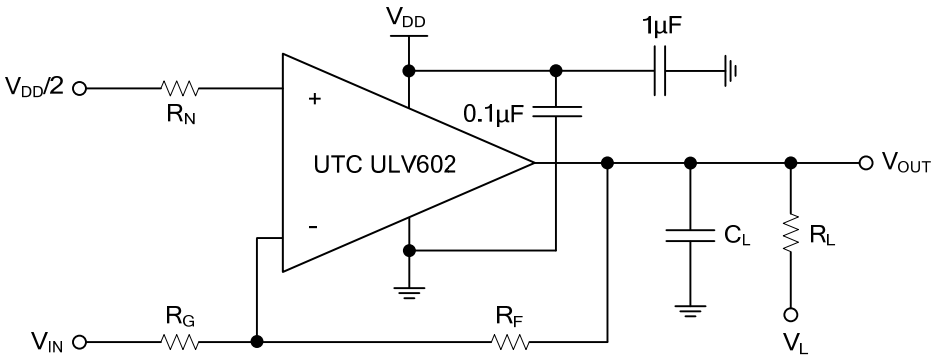
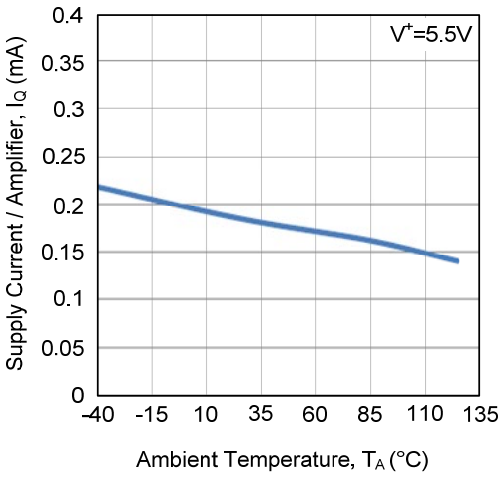


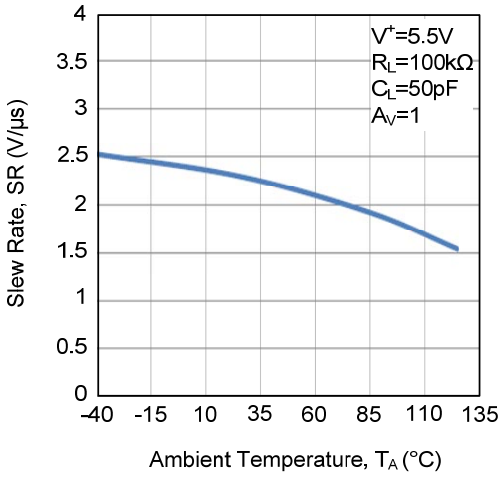
Figure 2. AC and DC Test Circuit for Most Inverting Gain Conditions.

■ TYPICAL CHARACTERISTICS

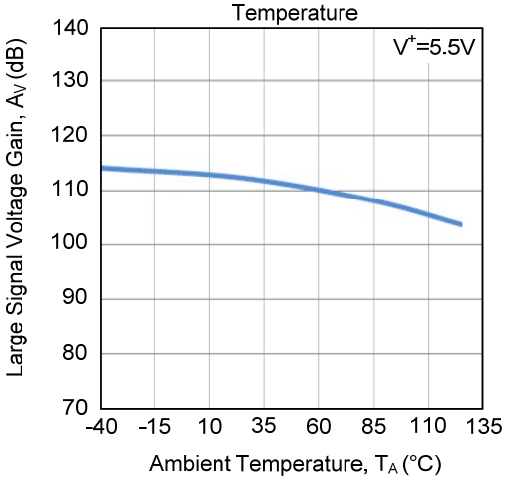
Supply Current vs. Temperature



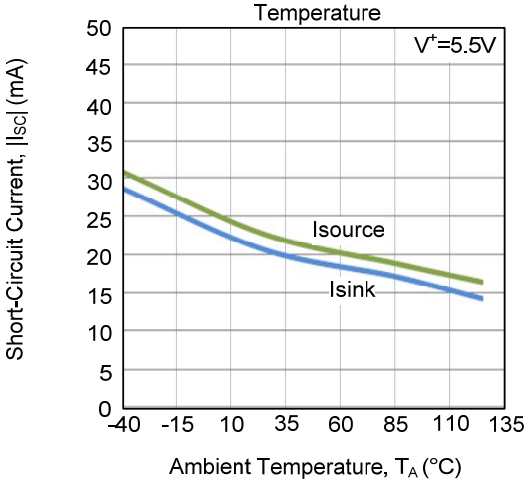
Slew Rate vs. Temperature



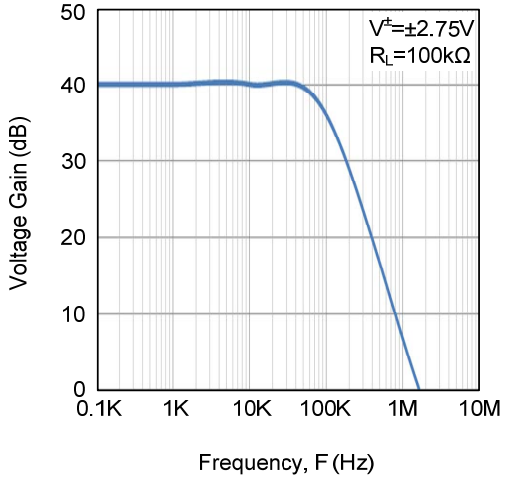
Large Signal Voltage Gain vs. Temperature



Output Short Circuit Current vs. Temperature



Voltage Gain vs. Frequency



Phase Shift vs. Frequency