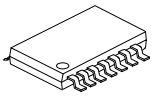
ULV4333

CMOS IC

MICRO-POWER , ZERO-DRIFT, RAIL-TO-RAIL INPUT/OUTPUT CMOS OPERATIONAL AMPLIFIERS



TSSOP-14

■ DESCRIPTION

The UTC **ULV4333** CMOS operational amplifiers provide very low offset voltage and zero-drift over time and temperature.

The miniature, high precision, low quiescent current amplifiers offer high-impedance inputs that have a wide input common mode range of 100mV beyond the rails and rail-to-rail output that swings within 35mV of the rails. Single or dual supplies as low as 1.8V (±0.9V) and up to 5.5V (±2.75V) may be used. They are optimized for low voltage, single or dual supply operation.

The UTC **ULV4333** offers excellent CMRR without the crossover associated with traditional complementary input stages. This design results in superior performance for driving analog-to-digital converters (ADCs) without degradation of differential linearity.

■ FEATURES

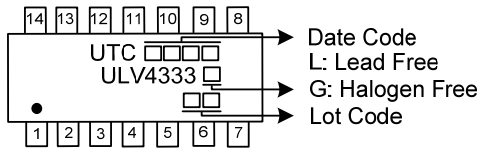
* Supply Voltage: 1.8V~5.5V
* Supply Current: 105μA / amplifier (Typ.)
* Input Offset Voltage: 25μV (Max.)
* Rail-to-Rail Input/Output
* Slew Rate: 0.25V/μs (Typ.)

■ ORDERING INFORMATION

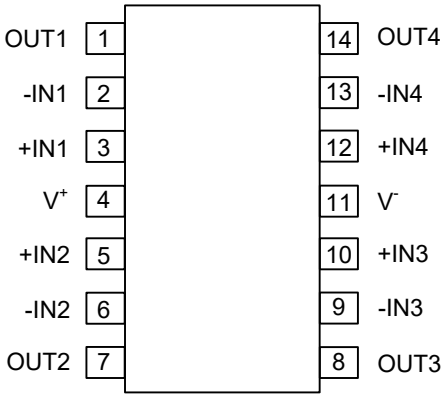
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV4333L-P14-R	ULV4333G-P14-R	TSSOP-14	Tape Reel

ULV4333G-P14-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) P14: TSSOP-14 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



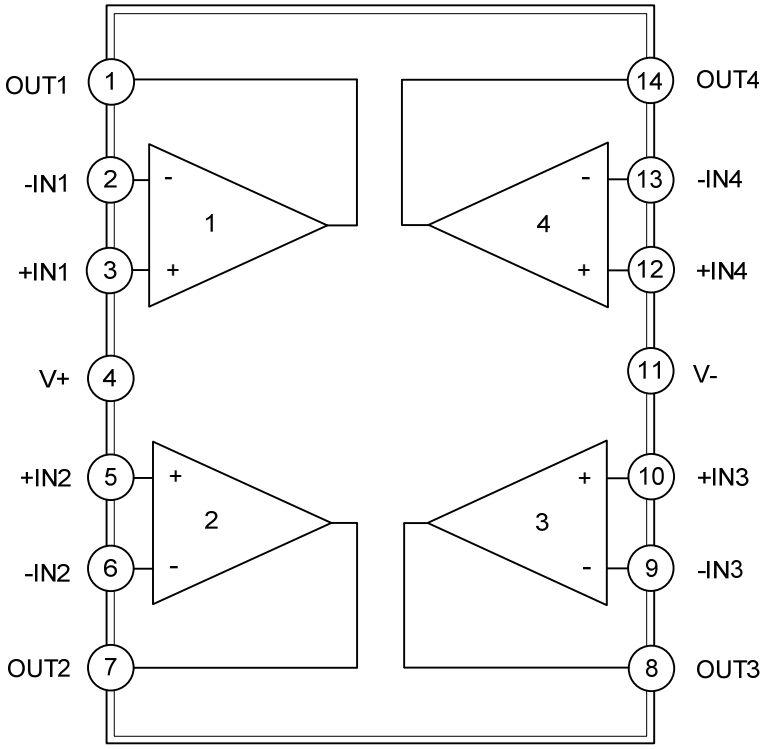
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT1	Output of 1 AMP
2	-IN1	Inverting input of 1 AMP
3	+IN1	Non-inverting input of 1 AMP
4	V^+	Positive Power Supply
5	+IN2	Non-inverting input of 2 AMP
6	-IN2	Inverting input of 2 AMP
7	OUT2	Output of 2 AMP
8	OUT3	Output of 3 AMP
9	-IN3	Inverting input of 3 AMP
10	+IN3	Non-inverting input of 3 AMP
11	V^-	Negative Power Supply
12	+IN4	Non-inverting input of 4 AMP
13	-IN4	Inverting input of 4 AMP
14	OUT4	Output of 4 AMP

■ BLOCK DIAGRAM



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

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+ - V^-$	6.0	V
Input Voltage	V_{IN}	$V^- - 0.3 \sim V^+ + 0.3$	V
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-65 ~ +150	°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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPWRAING CONDITIONS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	$V^+ - V^-$	1.8 ~ 5.5	V
Operating Free-Air Temperature	T_{OPR}	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

(V^+=1.8~5.5V, R_L=10kΩ connected to mid-supply, and V_{CM} = V_{OUT} = mid-supply)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current/Amplifier	I_Q	I_{OUT}=0		105	148	μA
Power Supply Rejection Ratio	PSRR	V^+=1.8V ~ 5.5V	98	120		dB
Input Offset Voltage	V_{OS}			14	25	uV
Input Bias Current	I_B			130		pA
Input Offset Current	I_{OS}			140		pA
Common-Mode Voltage Range	V_{CM}		V^--0.1		V^+-0.1	V
Common-Mode Rejection Ratio	CMRR	V_{IC}=0V ~ 5V	89	110		dB
Large Signal Voltage Gain	A_V	R_L=10kΩ	95	120		dB
Short-Circuit Current	I_{SC}	Sourcing, V_O= V^+		-32		mA
		Sinking, V_O= V^-		38		mA
Slew Rate	SR	G_V=1		0.25		V/μs
Gain-Bandwidth Product	GBW	C_L=100pF		350		KHz
Input-Referred Voltage Noise	e_n	f =0.1kHz~10Hz		2		$nV/\sqrt{Hz}$

Note: Specified by design and characterization. Amplifiers are 100% production screened at 25°C to reduce defective units.

■ TYPICAL APPLICATION CIRCUIT

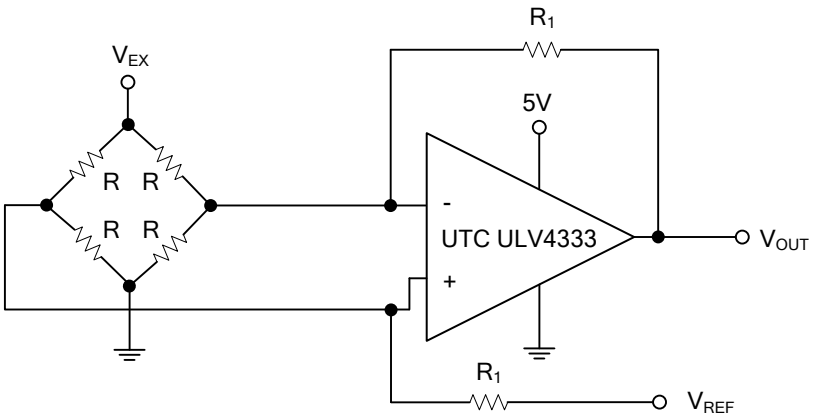


Figure 1. Single Op Amp Bridge Amplifier

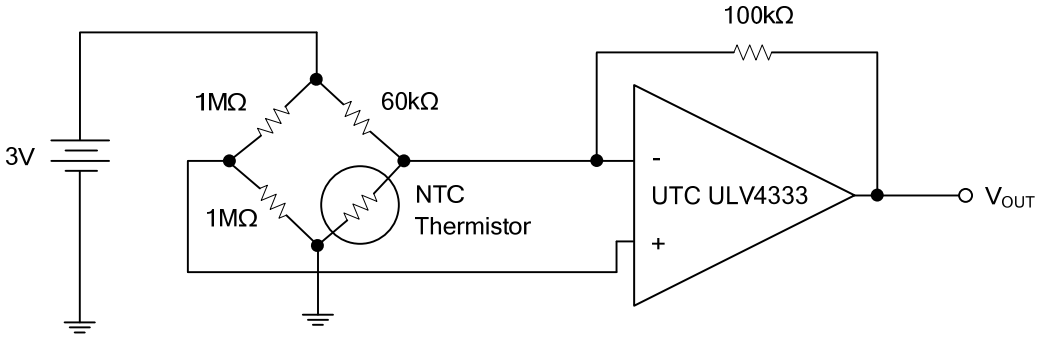
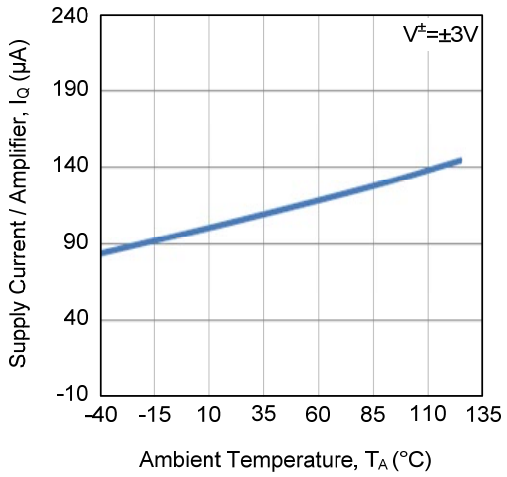


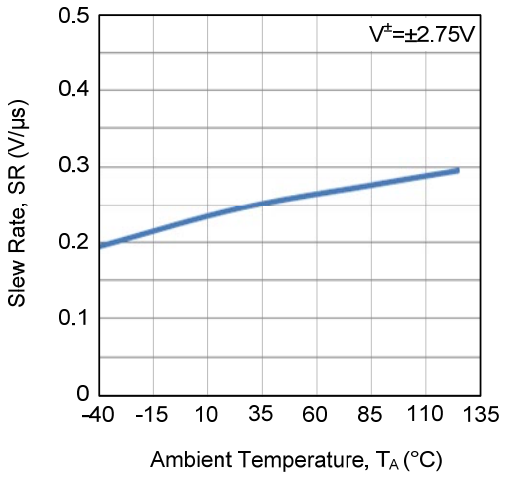
Figure 2. Thermistor Measurement

■ TYPICAL CHARACTERISTICS

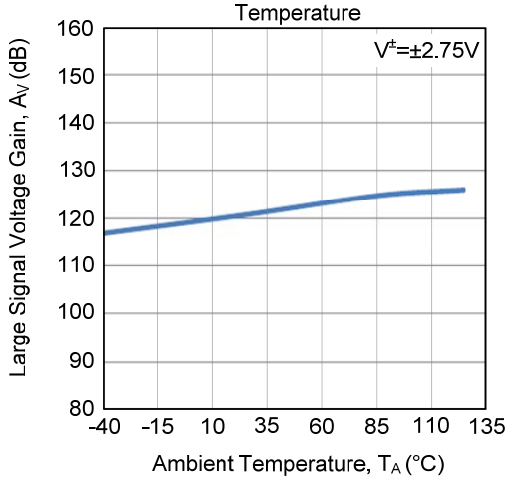
Supply Current vs. Temperature



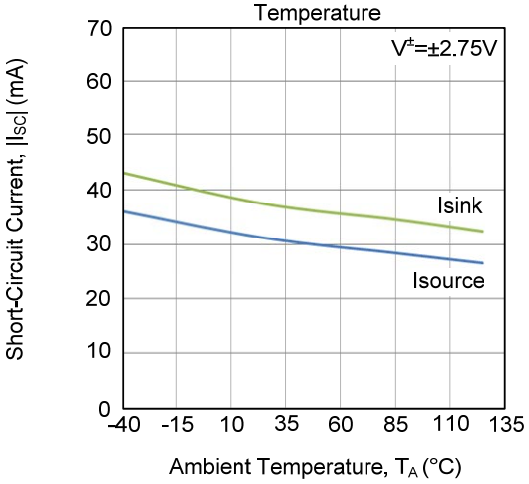
Slew Rate vs. Temperature



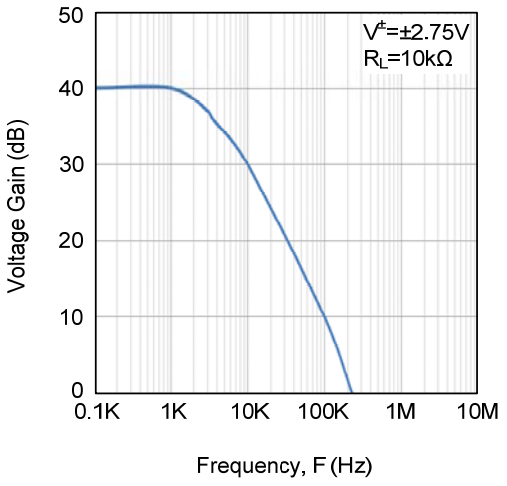
Large Signal Voltage Gain vs. Temperature



Output Short Circuit Current vs. Temperature



Voltage Gain vs. Frequency



Phase Shift vs. Frequency