

**ULV2333****CMOS IC****MICRO-POWER, ZERO-DRIFT,
RAIL-TO-RAIL INPUT/OUTPUT
CMOS DUAL OPERATIONAL
AMPLIFIERS****■ DESCRIPTION**

The UTC **ULV2333** CMOS dual 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 ($\pm 0.9V$) and up to 5.5V ($\pm 2.75V$) may be used. They are optimized for low voltage, single or dual supply operation.

The UTC **ULV2333** 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.

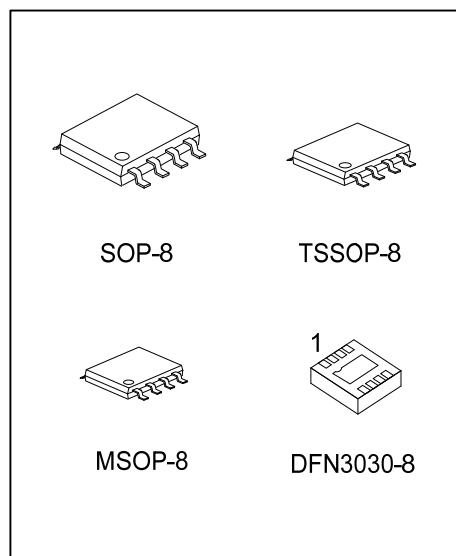
■ FEATURES

- * Supply Voltage Range: 1.8V ~ 5.5V
- * Supply Current: 80 μ A/Amplifier (Typ.)
- * Low Offset Voltage: 25 μ V (Max.)
- * Rail-to-Rail Input / Output
- * Slew Rate: 0.25V/ μ s (Typ.)

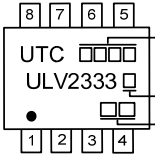
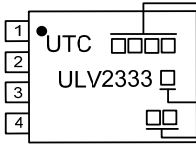
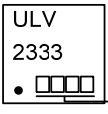
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV2333L-S08-R	ULV2333G-S08-R	SOP-8	Tape Reel
ULV2333L-SM1-R	ULV2333G-SM1-R	MSOP-8	Tape Reel
ULV2333L-P08-R	ULV2333G-P08-R	TSSOP-8	Tape Reel
ULV2333L-K08-3030-R	ULV2333G-K08-3030-R	DFN3030-8	Tape Reel

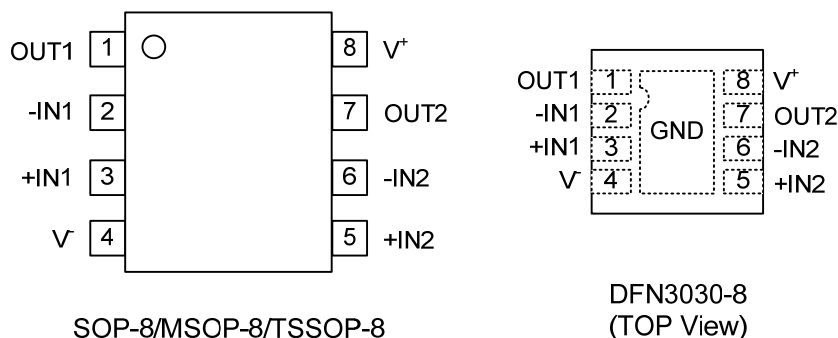
ULV2333G-S08-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) S08: SOP-8, P08: TSSOP-8, SM1: MSOP-8 K08-3030: DFN3030-8 (3) G: Halogen Free and Lead Free, L: Lead Free
--	--



MARKING

PACKAGE	MARKING
SOP-8 / MSOP-8	
TSSOP-8	
DFN3030-8	

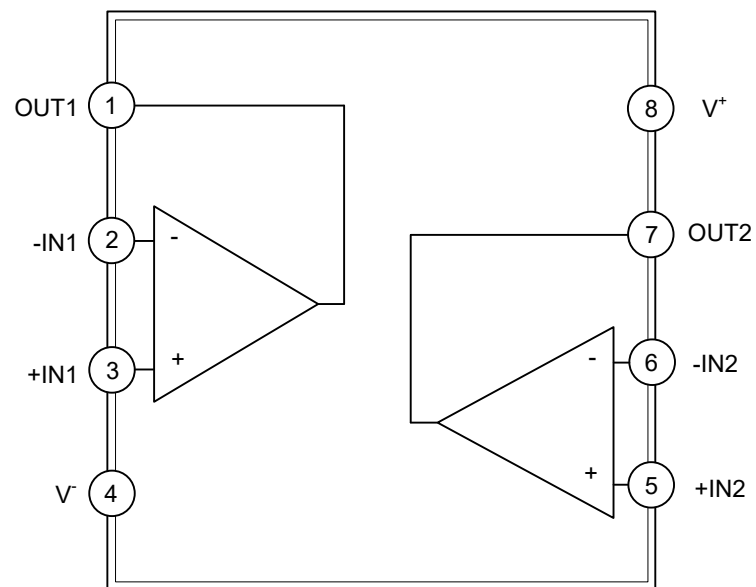
PIN CONFIGURATION



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-	Negative power supply
5	+IN2	Non-inverting input of 2 AMP
6	-IN2	Inverting input of 2 AMP
7	OUT2	Output of 2 AMP
8	V+	Positive power supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

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 Range	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.

■ RECOMMENDED OPERATING CONDITIONS

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

■ ELECTRICAL CHARACTERISTICS

($V^+ = 1.8 \sim 5.5V$, $R_L = 10k\Omega$ connected to $V^+/2$, and $V_{CM} = V^+/2$, $V_{OUT} = V^+/2$, $T_A = 25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current/Amplifier	I_Q	$I_{OUT} = 0$		80	148	μA
Power Supply Rejection Ratio	PSRR	$V^+ = 1.8V \sim 5.5V$	93	120		dB
Input Offset Voltage	V_{OS}			14	25	μV
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	$V_{IC} = 0V \sim 5V$	89	110		dB
Output Voltage Swing from Rail	V_O	$R_L = 10k\Omega$		24	35	mV
Large Signal Voltage Gain	A_V	$R_L = 10k\Omega$	95	121		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	$f = 0.1kHz \sim 10Hz$		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

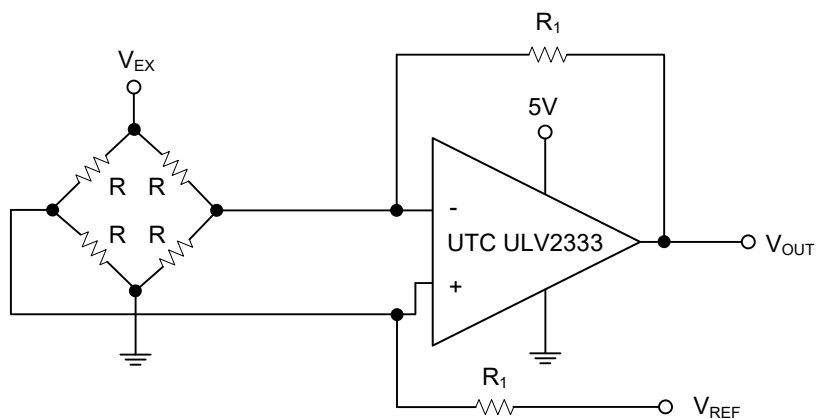


Figure 1. Bridge Amplifier Configuration

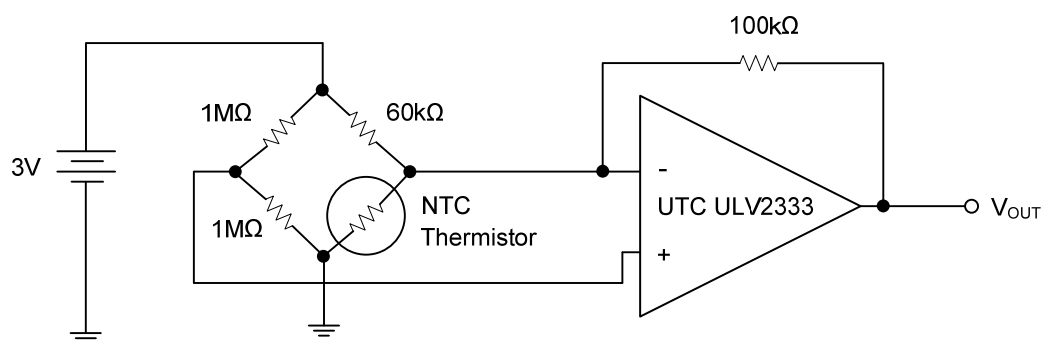
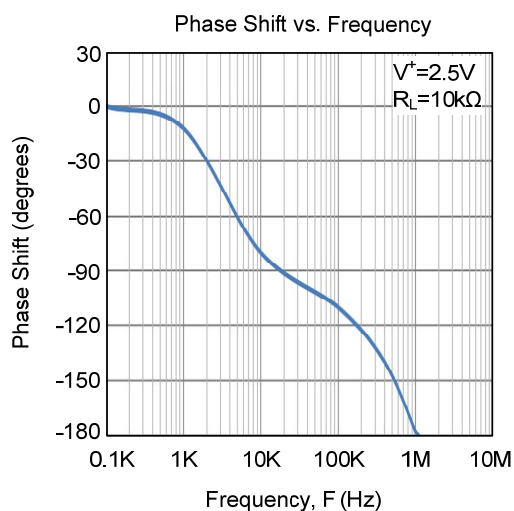
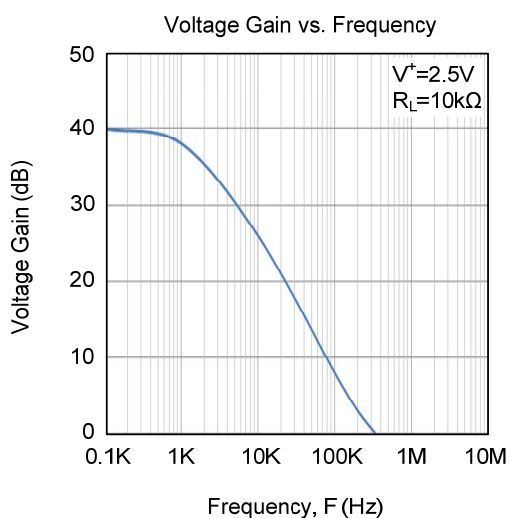
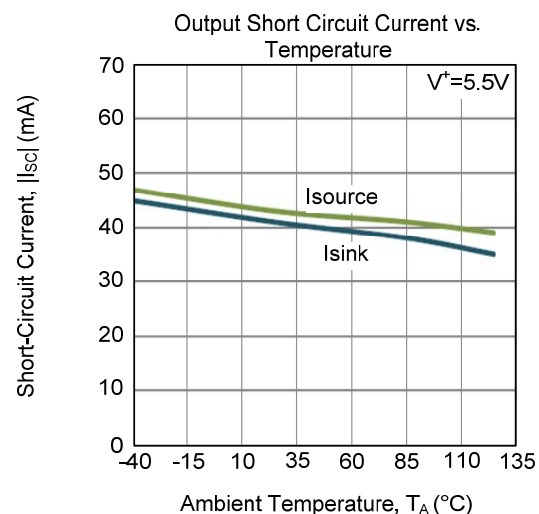
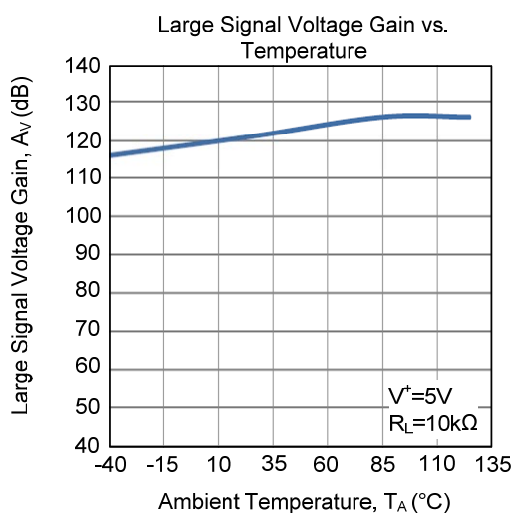
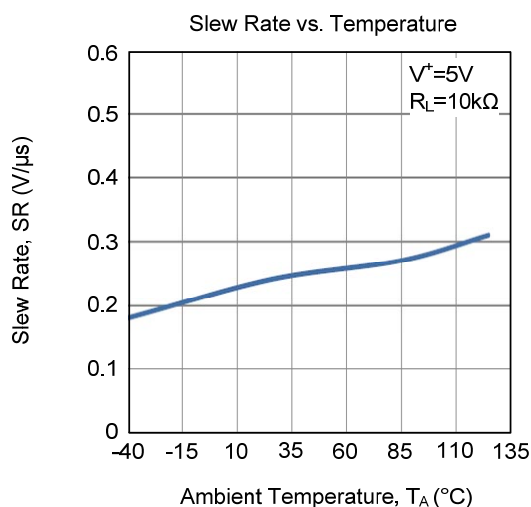
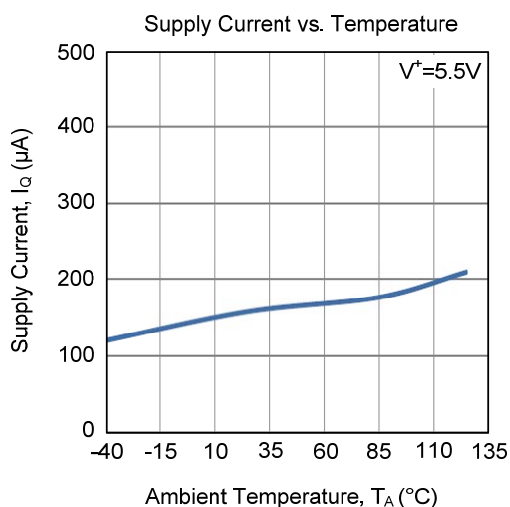
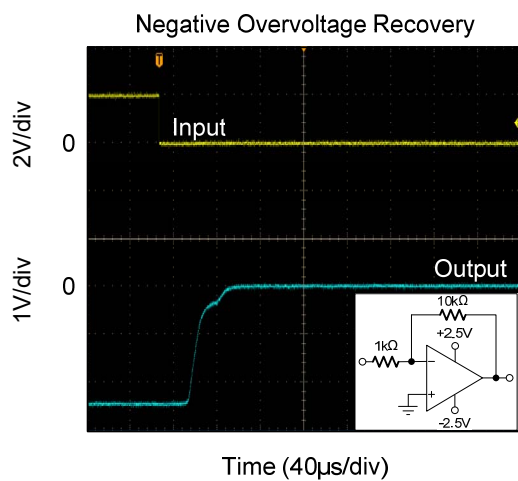
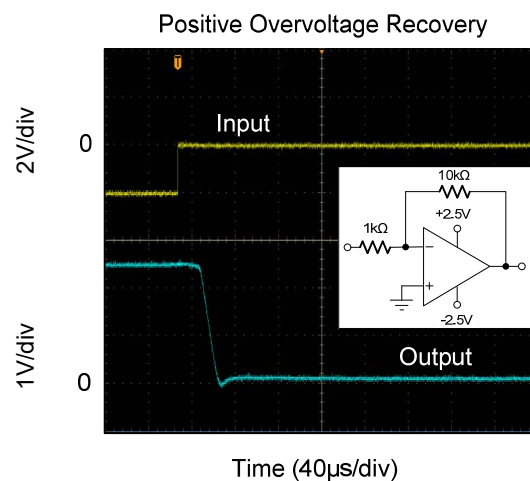
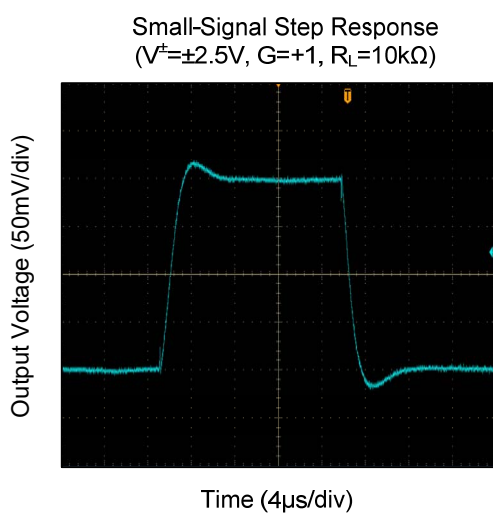
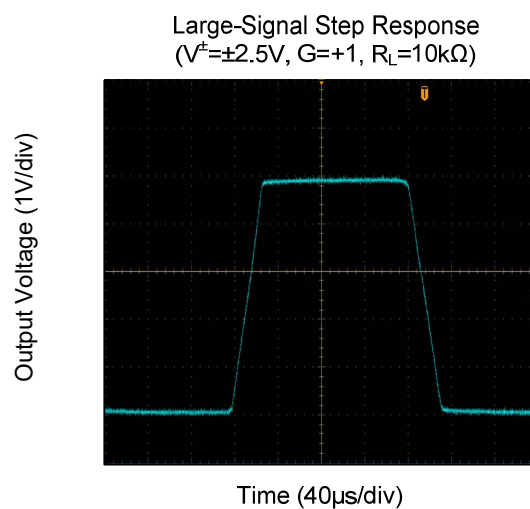
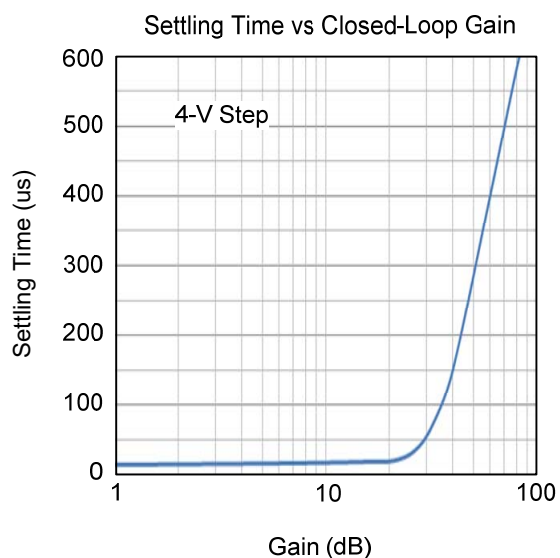


Figure 2. Thermistor Measurement

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.