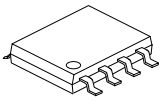
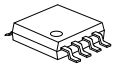
1.8V, MICRO-POWER CMOS ZERO-DRIFT OPERATIONAL AMPLIFIERS



SOP-8



MSOP-8

■ DESCRIPTION

The dual UTC **ULV2333** 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 **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
* Rail-to-Rail Input and Output
* Low Offset Voltage: 25μV (Max.)
* Low 0.1Hz to 10Hz Noise: 2μV_{P-P}
* Quiescent Current: 80μA/Amplifier (Typ.)
* Single or Dual Supply Operation
* Integrated RFI Filter

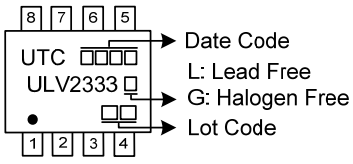
■ ORDERING INFORMATION

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

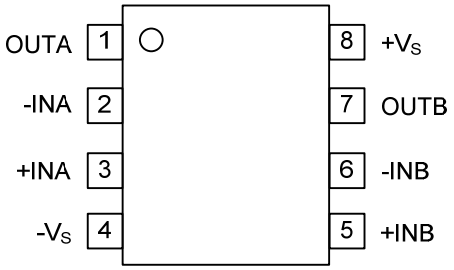
ULV2333G-S08-R

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

■ MARKING



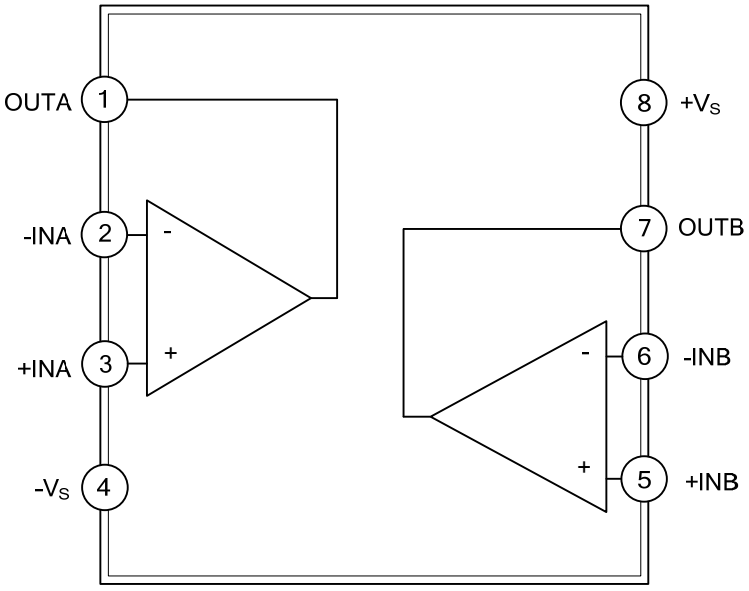
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUTA	Output (op amp A)
2	-INA	Inverting Input (op amp A)
3	+INA	Non-inverting Input (op amp A)
4	$-V_S$	Negative Power Supply
5	+INB	Non-inverting Input (op amp B)
6	-INB	Inverting Input (op amp B)
7	OUTB	Output (op amp B)
8	$+V_S$	Positive Power Supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	6	V
Input Common Mode Voltage Range	V_I	$(-V_S)$ - 0.3 ~ $(+V_S)$ + 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
Specified Voltage Range	V_{CC}	1.8 ~ 5.5	V
Operating Temperature Range	T_A	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

(At T_A =+25°C, V_S = 1.8V~5.5V, V_{CM} = V_S/2, V_{OUT} = V_S/2 and R_L = 10kΩ to V_S/2, Full = -40°C~ +125°C, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS							
Input Offset Voltage	V_{OS}	V_S = 5V	T_A =25°C		14	25	μV
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T_A$	T_A=-40°C~+125°C			0.08		μV/°C
Input Bias Current	I_B				130		pA
Input Common Mode Voltage Range	V_{CM}			$(-V_S)$ - 0.1		$(+V_S)$ + 0.1	V
Common-Mode Rejection Ratio	CMRR	$(-V_S)$ - 0.1V < V_{CM} < $(+V_S)$ + 0.1V	T_A =25°C	89	100		dB
			Full Range	85			dB
Open-Loop Voltage Gain	A_{OL}	$(-V_S)$ + 0.1V < V_{OUT} < $(+V_S)$ - 0.1V, R_L = 10kΩ	T_A =25°C	95	121		dB
			Full Range	94			dB
INPUT IMPEDANCE							
Differential		T_A =+25°C			10^9		Ω
Common Mode		T_A =+25°C			10^9		Ω
OUTPUT CHARACTERISTICS							
Output Voltage Swing from Rail		R_L = 10kΩ	T_A =25°C		24	35	mV
			Full Range			37	mV
Output Short-Circuit Current	I_{SC}	V_S = 1.8V			4		mA
		V_S = 5V			40		mA
Open-Loop Output Impedance		f = 350kHz, I_{OUT} = 0			1		kΩ
POWER SUPPLY							
Specified Voltage Range	V_S	T_A=-40°C~+125°C		1.8		5.5	V
Power Supply Rejection Ratio	PSRR	V_S = 1.8V~5.5V	T_A =25°C		4	20	μV/V
			Full Range			25	μV/V
Quiescent Current/Amplifier	I_Q	I_{OUT} = 0	T_A =25°C		80	148	μA
			Full Range			192	μA
Turn-On Time		V_S = 5V			200		μs
DYNAMIC PERFORMANCE							
Gain-Bandwidth Product	GBP	C_L = 100pF			350		kHz
Slew Rate	SR	G = +1			0.25		V/μs
NOISE							
Input Voltage Noise		f = 0.1Hz~10Hz			2		μV_{P-P}

■ TYPICAL APPLICATION CIRCUIT

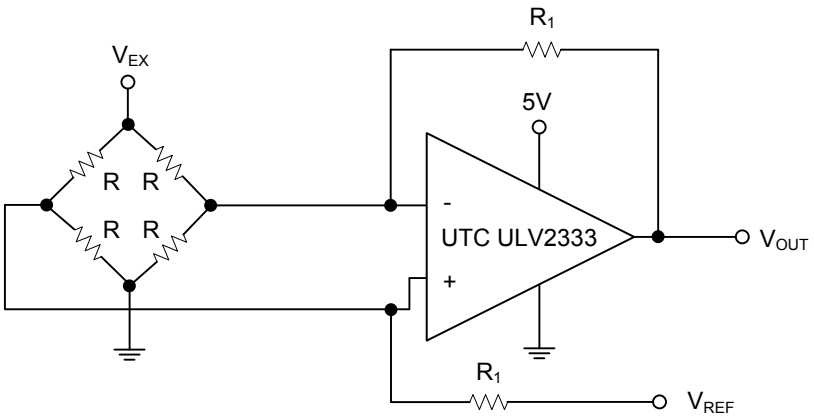


Figure 1. Bridge Amplifier Configuration

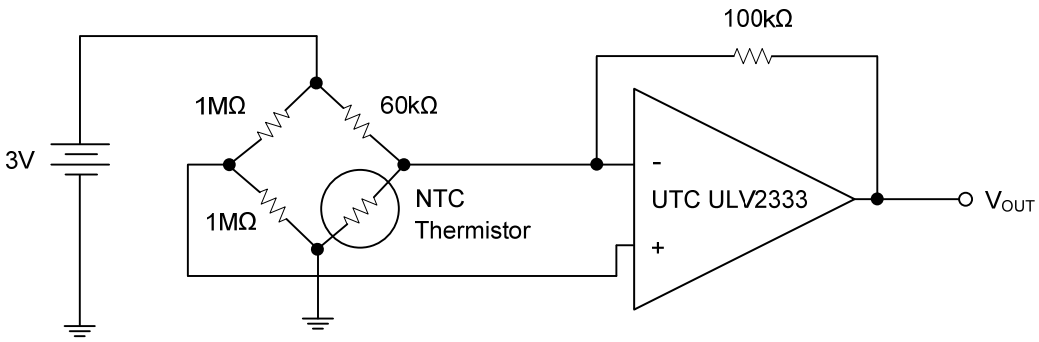


Figure 2. Thermistor Measurement