



ULV335

Preliminary

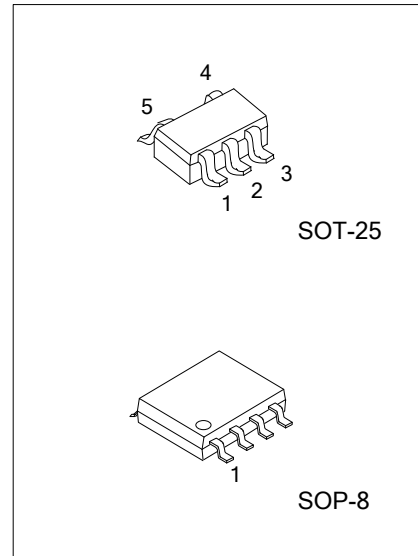
CMOS IC

ZERO-DRIFT, SINGLE-SUPPLY CMOS OPERATIONAL AMPLIFIERS

DESCRIPTION

The UTC **ULV335** is high-precision, low quiescent current CMOS operational amplifiers with very low offset voltage (1 μ V typ), and near-zero drift over time by using new auto-zeroing techniques. This amplifier offer high input impedance and rail-to-rail output swing. Single or dual supplies could be as low as +2.7V (\pm 1.35V) and up to +5.5V (\pm 2.75V).

This op amp is optimized for low-voltage, single-supply operation.



FEATURES

- * Low offset voltage: 1 μ V (typ)
- * Single-supply operation

ORDERING INFORMATION

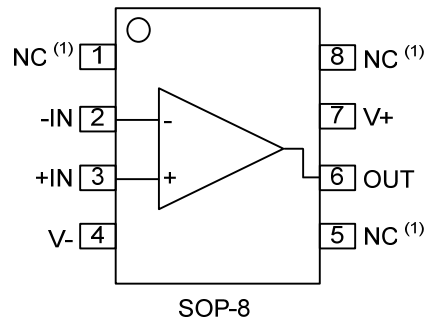
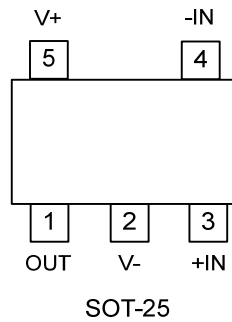
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV335L-AF5-R	ULV335G-AF5-R	SOT-25	Tape Reel
ULV335L-S08-R	ULV335G-S08-R	SOP-8	Tape Reel

<p>ULV335G-AF5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AF5: SOT-25, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

SOT-25	SOP-8
<p>V335 □ L: Lead Free G: Halogen Free</p>	<p>UTC □□□□ ULV335 □ □□□□ → Date Code L: Lead Free G: Halogen Free □□□□ → Lot Code</p>

■ PIN CONFIGURATION



Note 1.NC indicates no internal connection.

■ PIN DESCRIPTION

PIN NO.		PIN NAME	DESCRIPTION
SOT-25	SOP-8		
-	1, 5, 8	NC	No Intel Connection
4	2	-IN	Inverting Input
3	3	+IN	Non-Inverting Input
2	4	V-	Negative Power Supply
1	6	OUT	Output
5	7	V+	Positive Power Supply

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage		+7	V
Signal Input Terminals	Voltage (Note 2)	-0.5 ~ (V+)+0.5	V
	Current (Note 2)	±10	mA
Output Short Circuit (Note 3)		continuous	
Junction Temperature	T _J	+150	°C
Operating Temperature	T _{OPR}	-40 ~ +125	°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. Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less.
3. Short-circuit to ground, one amplifier per package.

■ THERMAL DATA

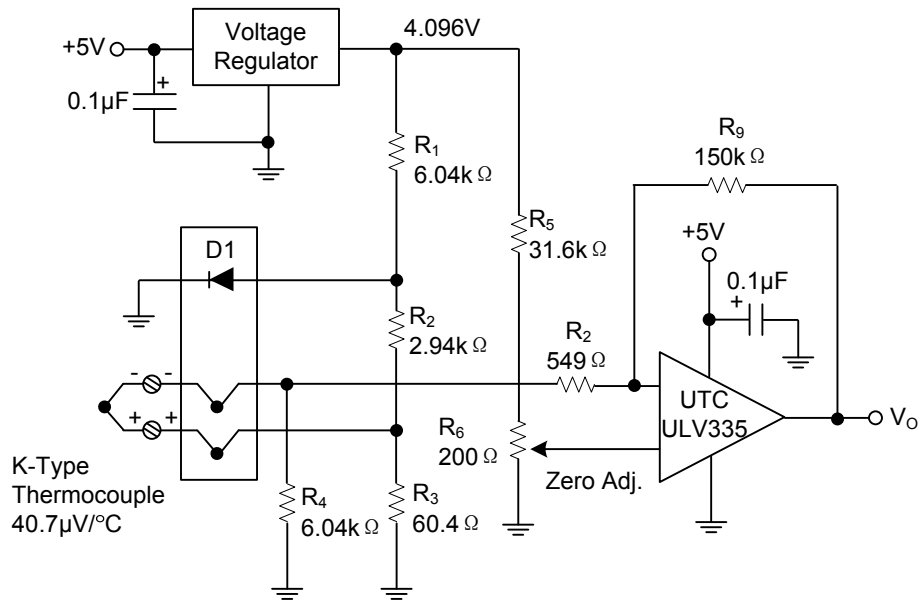
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	SOT-25	200	°C/W
	SOP-8	150	°C/W

■ ELECTRICAL CHARACTERISTICS

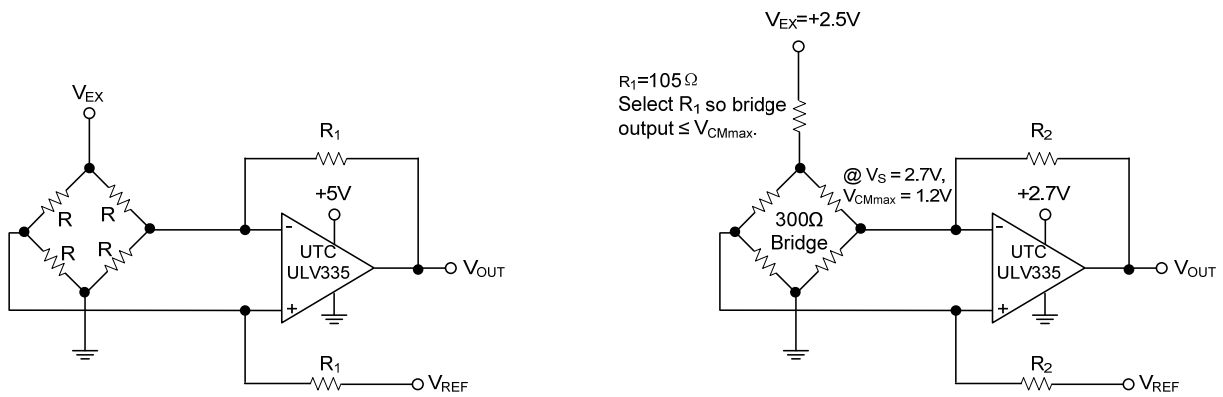
(T_A=25°C, V_S=+5V, R_L=10kΩ connected to V_S/2, and V_{OUT}=V_S/2, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFFSET VOLTAGE						
Input Offset Voltage	V _{OS}	V _{CM} = V _S /2		1	20	μV
Channel Separation, dc				0.1		μV/V
INPUT BIAS CURRENT						
Input Bias Current	I _B	V _{CM} = V _S /2		±70	±200	pA
Input Offset Current	I _{OS}			±120	±400	pA
NOISE						
Input Voltage Noise	e _n	f = 0.01Hz to 10Hz		1.4		μV _{PP}
Input Current Noise Density	i _n	f = 10Hz		20		fA/√Hz
input voltage range						
Common-Mode Voltage Range	V _{CM}		(V ₋)-0.1		(V ₊)-1.5	V
Common-Mode Rejection Ratio	CMRR	(V ₋)-0.1V < V _{CM} < (V ₊)-1.5V	100	110		dB
INPUT CAPACITANCE						
Differential				1		pF
Common-Mode				5		pF
OPEN-LOOP GAIN						
Open-Loop Voltage Gain, Over Temperature A _{OL}	A _V	50mV < V _O < (V ₊) -50mV, R _L = 100kΩ, V _{CM} = V _S /2	80	110		dB
FREQUENCY RESPONSE						
Gain-Bandwidth Product	GBW			2		MHz
Slew Rate	SR	G=+1		1.6		V/μs
OUTPUT						
Voltage Output Swing from Rail		R _L = 10kΩ		15	100	mV
Short-Circuit Current	I _{SC}			±60		mA
Capacitive Load Drive	C _{LOAD}		See Typical Characteristics			
POWER SUPPLY						
Operating Voltage Range			2.7		5.5	V
Quiescent Current	I _Q	I _O =0		350	600	μA

■ TYPICAL APPLICATION CIRCUIT



Temperature Measurement Circuit.

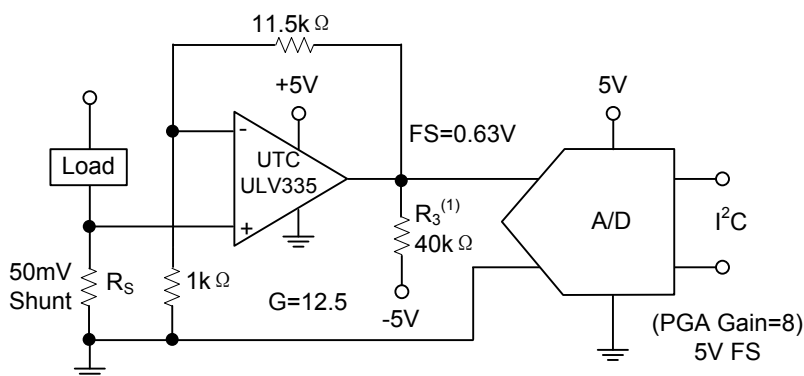


a. 5V Supply Bridge Amplifier.

b. 2.7V Supply Bridge Amplifier.

Single Op Amp Bridge Amplifier Circuits.

■ TYPICAL APPLICATION CIRCUIT (Cont.)



Note 1. Pull-down resistor to allow accurate swing to 0V.

Low-Side Current Measurement.

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