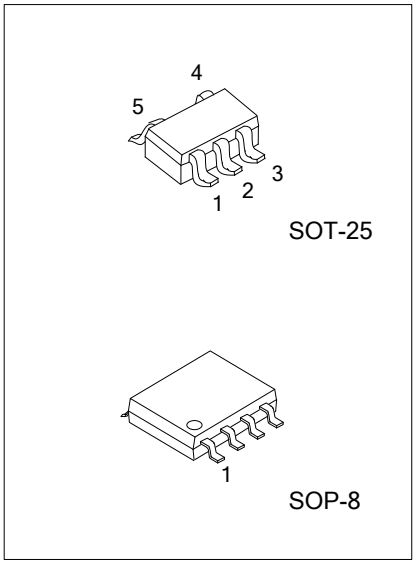
ZERO-DRIFT, SINGLE-SUPPLY CMOS OPERATIONAL AMPLIFIERS



■ DESCRIPTION

The UTC **ULV335** is high-precision, low quiescent current CMOS operational amplifiers with very low offset voltage (1μV 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 (±1.35V) and up to +5.5V (±2.75V).

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

■ FEATURES

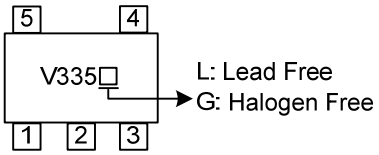
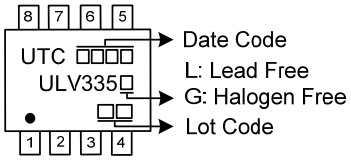
* Low offset voltage: 1μV (typ)
* Single-supply operation

■ ORDERING INFORMATION

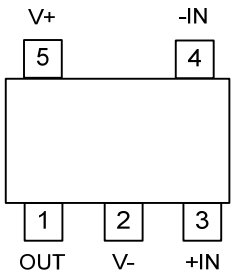
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV335L-AF5-R	ULV335G-AF5-R	SOT-25	Tape Reel
ULV335L-S08-R	ULV335G-S08-R	SOP-8	Tape Reel

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

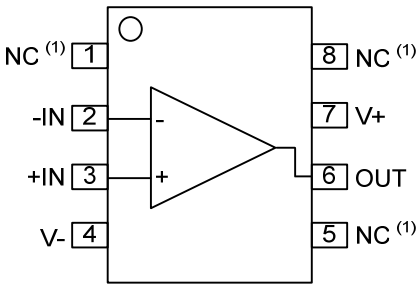
■ MARKING

SOT-25	SOP-8
	

■ PIN CONFIGURATION



SOT-25



SOP-8

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

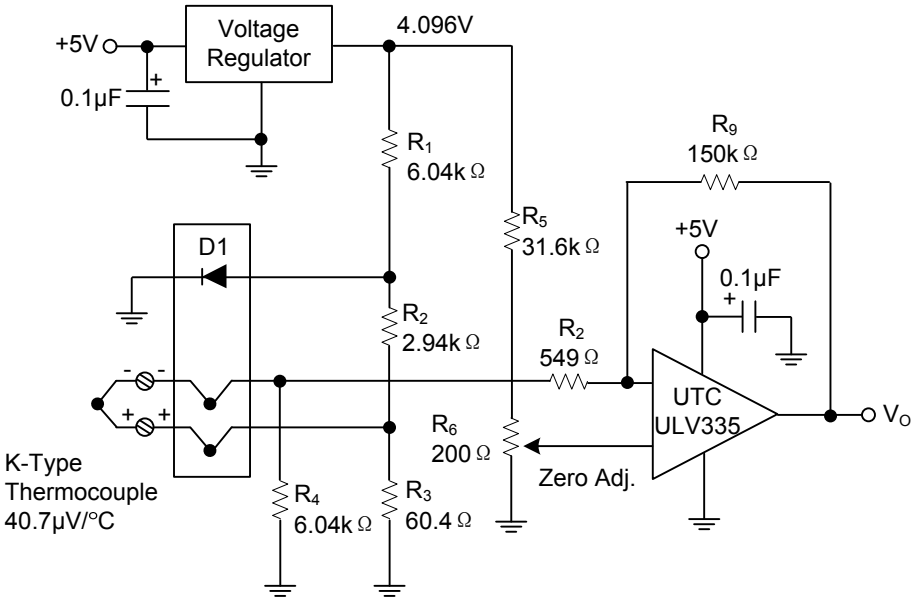
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	SOT-25	θ_{JA}	200	°C/W
	SOP-8		150	°C/W

■ ELECTRICAL CHARACTERISTICS

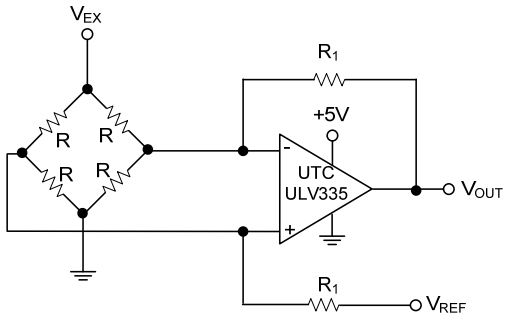
(T_A=25°C, V_S=+5V, R_L=10kΩ connected to V_S/2, and V_{OUT}=V_S /2, unless otherwise specified)

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		$fA/\sqrt{Hz}$
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

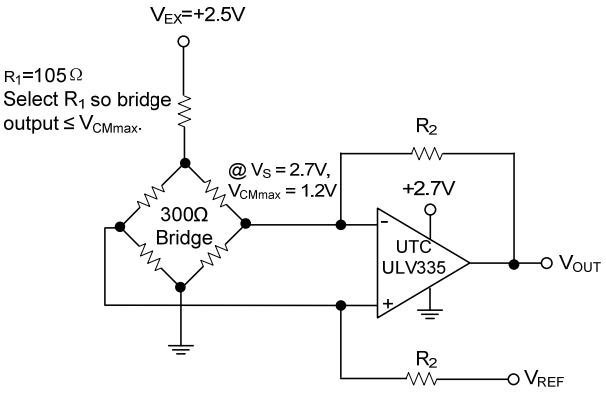
■ TYPICAL APPLICATION CIRCUIT



Temperature Measurement Circuit.



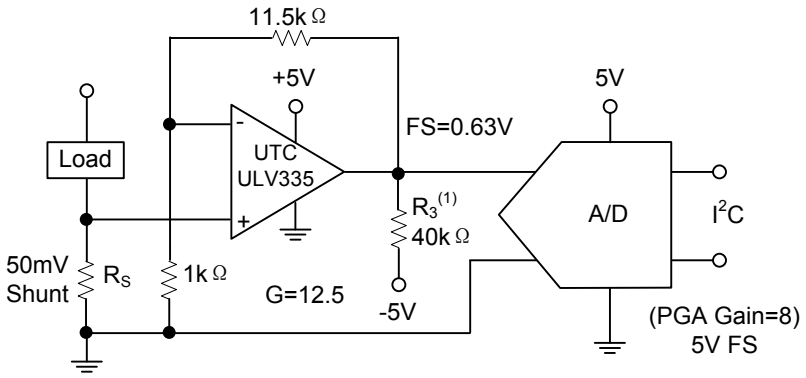
a. 5V Supply Bridge Amplifier.



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.