

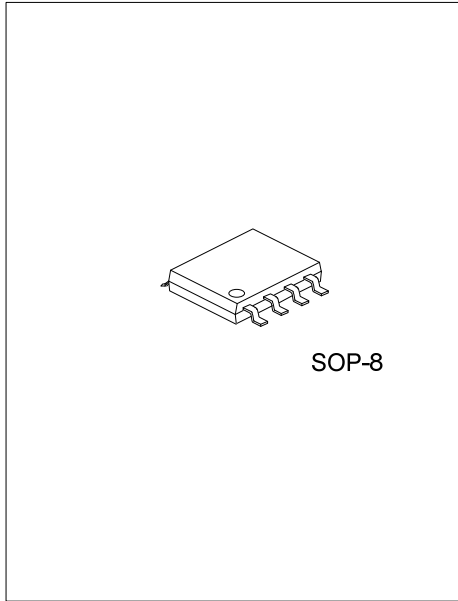


## ULV5532

Preliminary

CMOS IC

### 1.8V, 42µA, RAIL-TO-RAIL INPUT/OUTPUT, ZERO DRIFT OP-AMPS



#### DESCRIPTION

The dual UTC **ULV5532** CMOS operational amplifiers provide very low offset voltage and zero-drift over time and temperature.

The UTC **ULV5532** operate with a single supply voltage as low as 1.8V, while drawing 42µA per amplifier of quiescent current with a gain bandwidth product of 350kHz. It's unity gain stable, have no 1/f noise, have good Power Supply Rejection Ratio (PSRR) and Common Mode Rejection Ratio (CMRR), and feature rail-to-rail input and output swing.

#### FEATURES

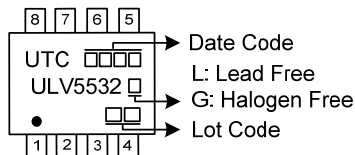
- \* Low Supply Current: 42 µA per Amplifier
- \* Low Offset Voltage: 100µV (Max)
- \* 0.1Hz to 10Hz Noise: 1.1µVPP
- \* Slew Rate: 0.16V/µs
- \* Bandwidth: 350kHz
- \* High Gain, 130dB High CMRR and PSRR
- \* Rail-to-rail Input and Output Swing

#### ORDERING INFORMATION

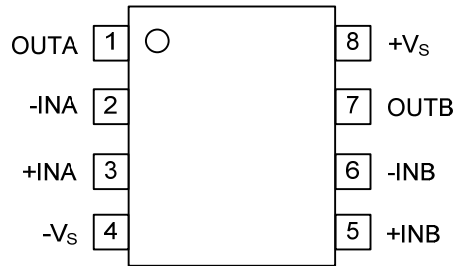
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV5532L-S08-R	ULV5532G-S08-R	SOP-8	Tape Reel

<p>ULV5532G-S08-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



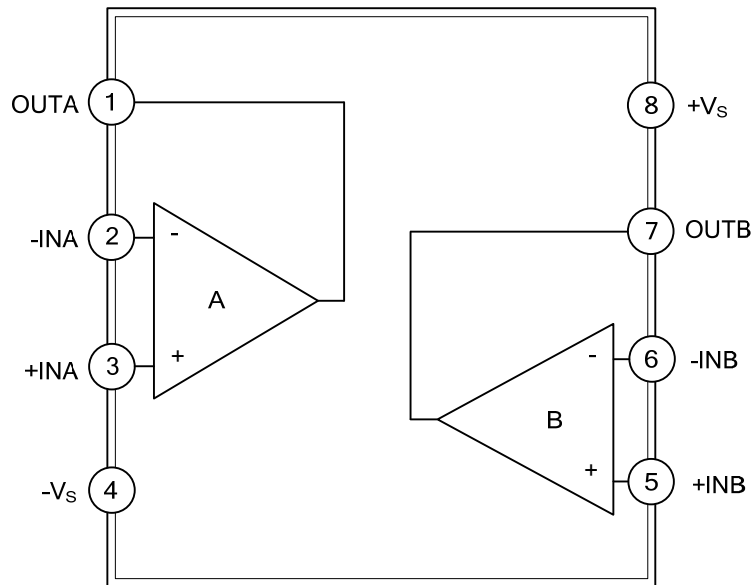
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUTA	Output pin of A AMP
2	-INA	Inverting input pin of A AMP
3	+INA	Non-inverting input of A AMP
4	-Vs	Negative power supply
5	+INB	Non-inverting input of B AMP
6	-INB	Inverting input pin of B AMP
7	OUTB	Output pin of B AMP
8	+Vs	Positive power supply

■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING

[Over operating free-air temperature range (unless otherwise specified.)]

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	6	V
Input Voltage	$V_I$	$V^- - 0.2 \sim V^+ + 0.2$	V
Input Current +IN, -IN (Note 2)		$\pm 20$	mA
Output Short-Circuit Duration (Note 3)		Indefinite	
Current at Supply Pins		$\pm 50$	mA
Maximum Junction Temperature	$T_J$	+150	°C
Operating Temperature Range	$T_{OPR}$	-40 ~ +125	°C
Storage Temperature Range	$T_{STG}$	-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 inputs are protected by ESD protection diodes to each power supply. If the input extends more than 500mV beyond the power supply, the input current should be limited to less than 10mA.

3. A heat sink may be required to keep the junction temperature below the absolute maximum. This depends on the power supply voltage and how many amplifiers are shorted. Thermal resistance varies with the amount of PC board metal connected to the package. The specified values are for short traces connected to the leads.

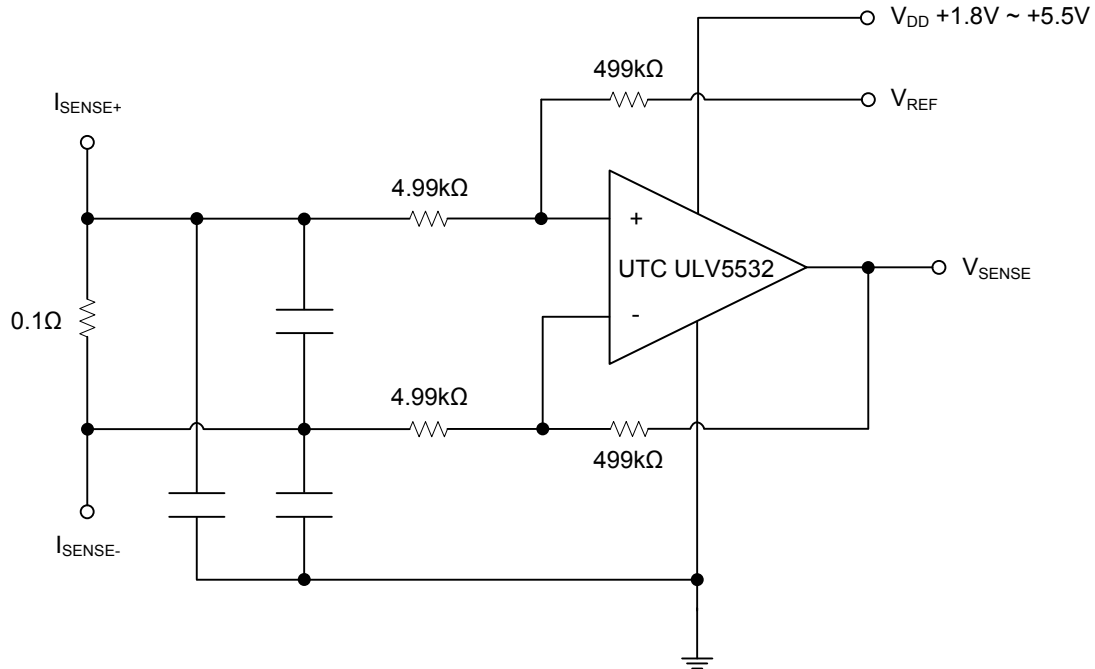
## ■ ELECTRICAL CHARACTERISTICS

( $T_A=27^\circ\text{C}$ ,  $V_S=5\text{V}$ ,  $R_L=10\text{k}\Omega$ ,  $V_{CM}=V_{DD}/2$ , unless otherwise specified.)

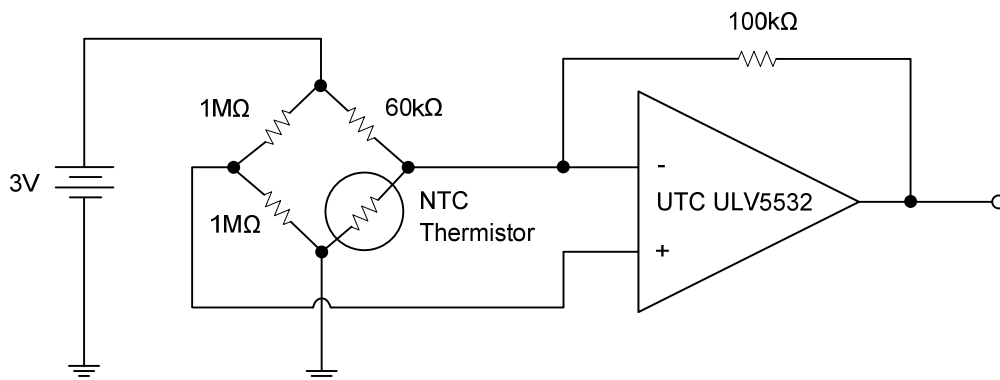
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage Range	$V_S$		1.8		5.5	V
Quiescent Current per Amplifier	$I_Q$			42	60	$\mu\text{A}$
Input Offset Voltage	$V_{OS}$	$V_{CM}=2.5\text{V}$	-100	1	100	$\mu\text{V}$
		$V_{CM}=0.05\sim 4.95\text{V}$	-110		110	$\mu\text{V}$
		$V_S=1.8\text{V}$ , $V_{CM}=0.9\text{V}$	-120		120	$\mu\text{V}$
vs Temperature	$dV_{OS}/dT$		0.008	0.05	$\mu\text{V}/^\circ\text{C}$	
vs Power Supply	PSRR	$V_S = 3\text{V} \sim 5\text{V}$	90	120		dB
Input Voltage Noise	$V_N$	$f=0.01\text{Hz}$ to $1\text{Hz}$		0.4		$\mu\text{V}_{pp}$
		$f=0.1\text{Hz}$ to $10\text{Hz}$		1.1		$\mu\text{V}_{pp}$
Input Voltage Noise Density	$e_n$	$f=1\text{kHz}$		55		$\text{nV}/\sqrt{\text{Hz}}$
Input Capacitor	$C_{IN}$	Differential		3		pF
		Common-Mode		2		pF
Input Bias Current	$I_B$			$\pm 50$		pA
Over Temperature				$\pm 800$		pA
Input Offset Current	$I_{OS}$			$\pm 100$		pA
Common-Mode Voltage Range	$V_{CM}$		(V <sup>-</sup> )-0.1		(V <sup>+</sup> )+0.1	V
Common-Mode Rejection Ratio	CMRR	$V_{CM}=0.5$ to $4.5\text{V}$	90	120		dB
Output Voltage Swing from Rail	$V_O$	$R_L=10\text{k}\Omega$		5	25	mV
Short-Circuit Current	$I_{SC}$			$\pm 52$		mA
Unity Gain Bandwidth	GBWP	$C_L=100\text{pF}$		350		kHz
Slew Rate	SR	$G=+1$ , $C_L=100\text{pF}$		0.23		$\text{V}/\mu\text{s}$
Overload Recovery Time	$t_{OR}$	$G=-10$		60		$\mu\text{s}$
Settling Time to 0.01%	$t_S$	$C_L=100\text{pF}$ , $G=+1$ , 5V Step		40		$\mu\text{s}$
Open-Loop Voltage Gain	$A_{VOL}$	(V <sup>-</sup> )+100mV < $V_O$ < (V <sup>+</sup> )-100mV, $R_L=100\text{k}\Omega$	94	120		dB

■ TYPICAL APPLICATION CIRCUIT

Bi-Directional Current Sense Amplifier



Thermistor Measurement



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