



ULV6042

Preliminary

CMOS IC

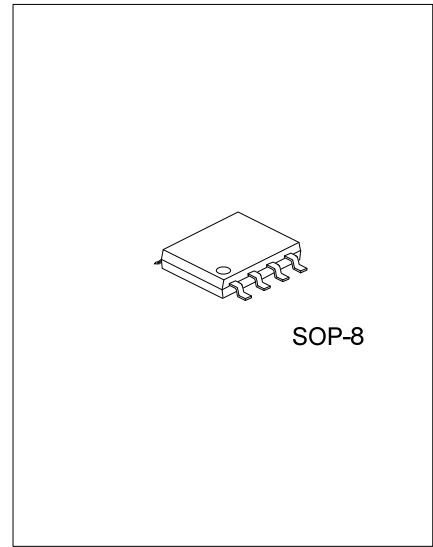
MICRO-POWER, RAIL-TO-RAIL INPUT/OUTPUT OPERATIONAL AMPLIFIERS

DESCRIPTION

The UTC **ULV6042** operational amplifier is offered dual configurations.

The UTC **ULV6042** of operational amplifiers (op amps) with a single supply voltage as low as 1.4V, while drawing less than 1.2µA (maximum) of quiescent current per amplifier. This device is also designed to support rail-to-rail input and output operation. This combination of features supports battery-powered and portable applications.

The UTC **ULV6042** amplifier has a gain-bandwidth product of 14 kHz (typical) and is unity gain stable. This specification makes these op amps appropriate for low frequency applications, such as battery current monitoring and sensor conditioning.



FEATURES

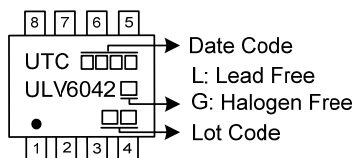
- * Wide Supply Voltage Range: 1.4V ~ 6.0V
- * Low Quiescent Current: 900nA/amplifier (typical)
- * Rail-to-Rail Input/Output
- * Gain Bandwidth Product: 14kHz (typical)
- * Unity Gain Stable
- * Available in Dual

ORDERING INFORMATION

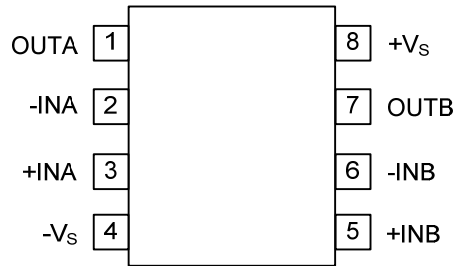
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV6042L-S08-R	ULV6042G-S08-R	SOP-8	Tape Reel

<p>ULV6042G-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



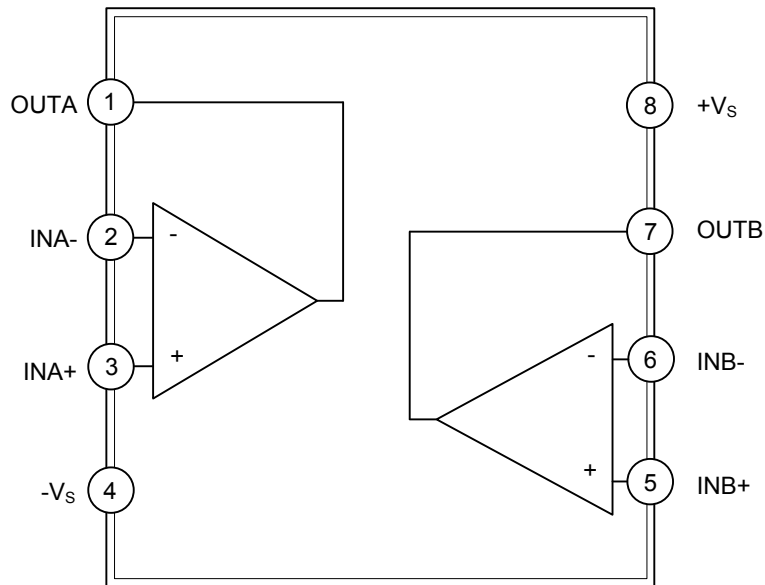
■ PIN CONFIGURATION



■ PIN DESCRIPTION

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

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
$V_{DD} - V_{SS}$		7.0	V
Current at Input Pins		± 2	mA
Analog Inputs (V_{IN+} , V_{IN-})		$-V_S - 1.0 \sim +V_S + 1.0$	V
All Other Inputs and Outputs		$-V_S - 0.3 \sim +V_S + 0.3$	V
Difference Input Voltage		$ +V_S - (-V_S) $	
Output Short Circuit Current		continuous	
Current at Output and Supply Pins		± 30	mA
Junction Temperature	T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-65 ~ +150	$^{\circ}\text{C}$

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.

■ TEMPERATURE CHARACTERISTICS

(Unless otherwise indicated, $V_{DD}=1.4\text{V} \sim 5.5\text{V}$, $V_{SS}=\text{GND}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Temperature Ranges						
Operating Temperature Range	T_A		-40		+85	$^{\circ}\text{C}$
Storage Temperature Range	T_A		-65		+150	$^{\circ}\text{C}$

■ THERMAL DATA

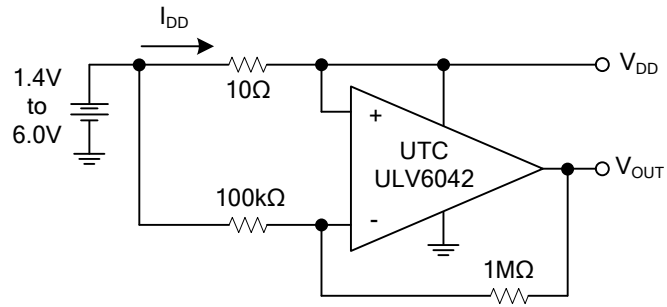
PARAMETER	SYMBOL	RATING	UNIT
Thermal Resistance	θ_{JA}	158	$^{\circ}\text{C}/\text{W}$

■ DC ELECTRICAL CHARACTERISTICS

Unless otherwise indicated, $+V_S = +1.4V \sim +5.5V$, $-V_S = GND$, $T_A = 25^\circ C$, $V_{CM} = +V_S/2$, $V_{OUT} \approx +V_S/2$, and $R_L = 1M\Omega$

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Supply						
Quiescent Current per Amplifier	I_Q	$I_O = 0$	0.1	0.9	1.2	μA
Power Supply Rejection	PSRR	$V_{CM} = -V_S$	70	90		dB
Supply Voltage	$+V_S$	(Note 1)	1.4		6.0	V
Input Characteristics						
Input Offset Voltage	V_{OS}	$V_{CM} = +V_S/2$	-4		+4	mV
Input Bias Current	I_B			20		pA
Input Offset Current	I_{OS}			10		pA
Common-Mode Input Range	V_{CM}		$-V_S-0.3$		$+V_S+0.3$	V
Common Mode Rejection Ratio	CMRR	$+V_S = 5V, V_{CM} = -0.3V \sim 5.3V$	62	80		dB
		$+V_S = 5V, V_{CM} = 2.5V \sim 5.3V$	60	75		dB
		$+V_S = 5V, V_{CM} = -0.3V \sim 2.5V$	60	80		dB
Open-Loop Voltage Gain	A_V	$R_L = 50k\Omega$ $V_{OUT} = 0.1V \sim +V_S-0.1V$	80	95		dB
Common Mode Input Impedance	Z_{CM}			$10^{13} 6$		ΩpF
Differential Input Impedance	Z_{DIFF}			$10^{13} 6$		ΩpF
Output Characteristics						
Maximum Output Voltage Swing	V_{OL}, V_{OH}	$R_L = 50k\Omega$	$V_{SS} + 10$		$V_{DD} - 10$	mV
Output Short Circuit Current	I_{SC}	$V_{DD} = 1.4V$		1.5		mA
		$V_{DD} = 5.5V$		15		mA
Dynamic Performance ($C_L=60pF$)						
Slew Rate	SR			3.0		V/ms
Gain Bandwidth Product	GBW			14		kHz
Phase Margin	PM	$G = +1V/V$		65		$^\circ$
Noise						
Input Voltage Noise	E_{ni}	$f = 0.1Hz \sim 10Hz$		5.5		μV_{P-P}
Input Voltage Noise Density	e_{ni}	$f = 1kHz$		180		$nV \sqrt{Hz}$
Input Current Noise Density	i_{ni}	$f = 1kHz$		1		$fA \sqrt{Hz}$

■ TYPICAL APPLICATION CIRCUIT

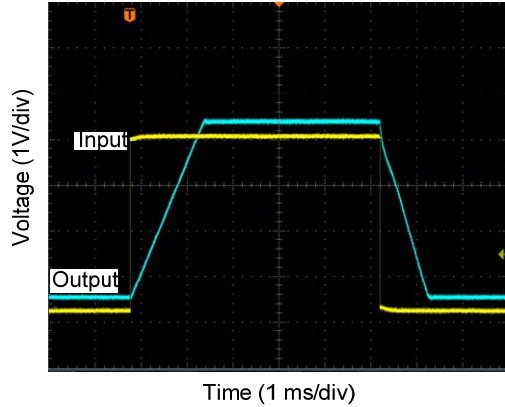


$$I_{DD} = \frac{V_{DD} - V_{OUT}}{(10V/V) \cdot (10\Omega)}$$

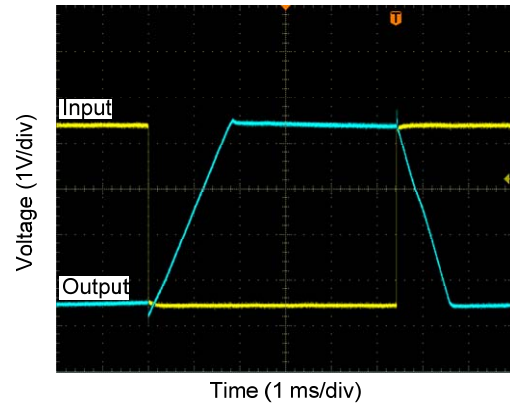
High Side Battery Current Sensor

■ TYPICAL CHARACTERISTICS

Large Signal Non-inverting
 (+V_S=5V, R_L=50kΩ, G=+1V/V)



Large Signal Inverting Pulse
 (+V_S=5V, R_L=50kΩ, G=-1V/V)



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