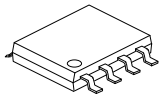
MICRO-POWER, RAIL-TO-RAIL INPUT/OUTPUT OPERATIONAL AMPLIFIERS



SOP-8

■ 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

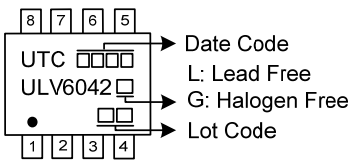
* Wide Supply Voltage Range: 1.4V ~ 6.0V
* Low Quiescent Current: 900nA/amplifier (typical)
* Rail-to-Rail Input/Output
* Gain Bandwidth Product: 14kHz (typical)
* Unity Gain Stable
* Available in Dual

■ ORDERING INFORMATION

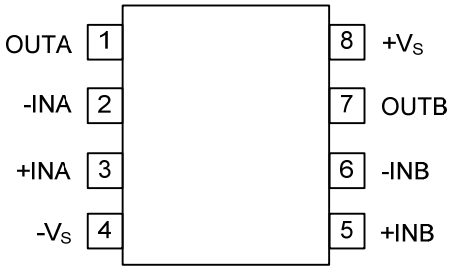
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV6042L-S08-R	ULV6042G-S08-R	SOP-8	Tape Reel

ULV6042G-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



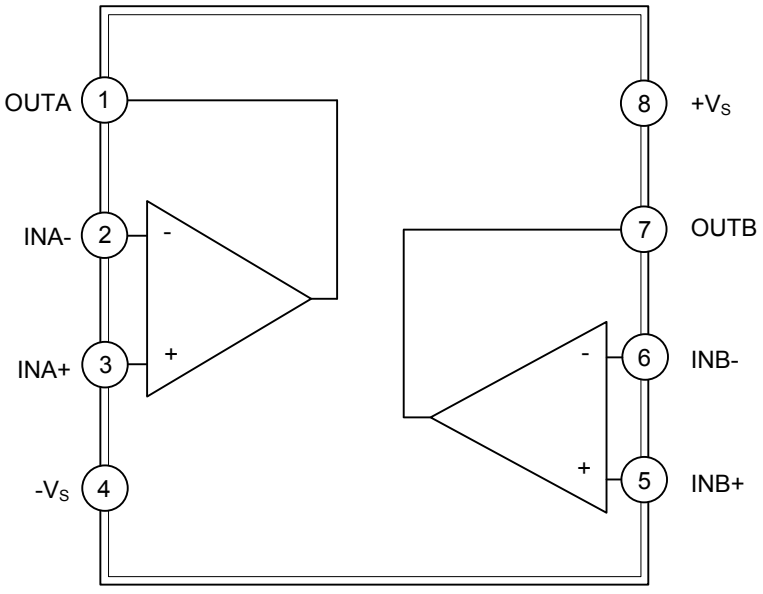
■ PIN CONFIGURATION



■ 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	$-V_S$	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	$+V_S$	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 ~ +V_S +1.0	V
All Other Inputs and Outputs		-V_S - 0.3 ~ +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	°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.

■ TEMPERATURE CHARACTERISTICS

(Unless otherwise indicated, V_{DD}=1.4V ~ 5.5V, V_{SS}=GND)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Temperature Ranges						
Operating Temperature Range	T_A		-40		+85	°C
Storage Temperature Range	T_A		-65		+150	°C

■ THERMAL DATA

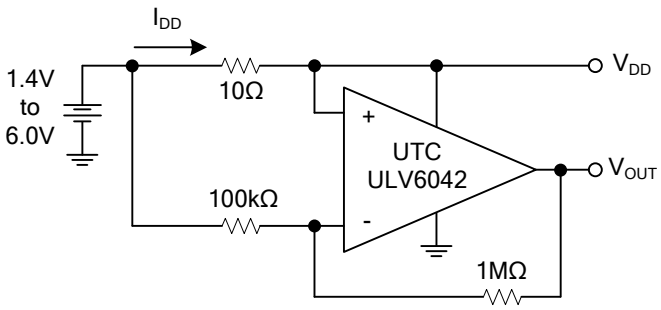
PARAMETER	SYMBOL	RATING	UNIT
Thermal Resistance	θ_{JA}	158	°C/W

■ DC ELECTRICAL CHARACTERISTICS

Unless otherwise indicated, $+V_S$ = +1.4V ~ +5.5V, $-V_S$ = GND, T_A = 25°C, V_{CM} =$+V_S$/2, V_{OUT}≈$+V_S$/2, and R_L = 1MΩ

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 ~ 5.3V	62	80		dB
		$+V_S$ = 5V, V_{CM} = 2.5V ~ 5.3V	60	75		dB
		$+V_S$ = 5V, V_{CM} = -0.3V ~ 2.5V	60	80		dB
Open-Loop Voltage Gain	A_V	R_L = 50kΩ V_{OUT} = 0.1V~ $+V_S$-0.1V	80	95		dB
Common Mode Input Impedance	Z_{CM}			10^{13}||6		Ω||pF
Differential Input Impedance	Z_{DIFF}			10^{13}||6		Ω||pF
Output Characteristics						
Maximum Output Voltage Swing	V_{OL}, V_{OH}	R_L = 50kΩ	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		°
Noise						
Input Voltage Noise	E_{ni}	f = 0.1Hz ~ 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

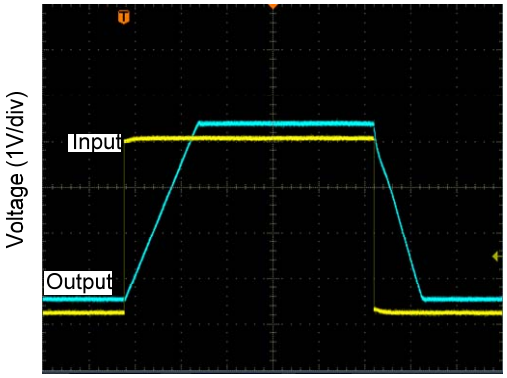


$$I_{DD} = \frac{V_{DD} - V_{OUT}}{(10V/V)\cdot(10\Omega)}$$

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)