



ULV4347

Preliminary

CMOS IC

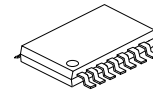
MICROPOWER, RAIL-TO-RAIL OPERATIONAL AMPLIFIERS

DESCRIPTION

The UTC **ULV4347** is a microPower, low-cost operational amplifier available in micropackages. The UTC **ULV4347** (quad) is available in the TSSOP-14.

The small size and low power consumption (34µA per channel maximum) of the UTC **ULV4347** make it ideal for portable and battery-powered applications. The input range of the UTC **ULV4347** extends 200mV beyond the rails, and the output range is within 5mV of the rails.

The UTC **ULV4347** can be operated with a single or dual power supply from 2.5V to 5.5V.



TSSOP-14

FEATURES

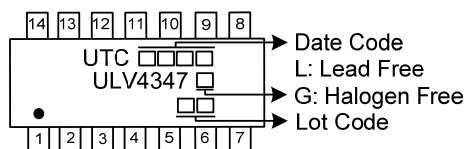
- * Supply Voltage:2.5~5.5V
- * Supply Current/Amplifier:34 µA (Max)
- * Input Offset Voltage:8mV (Max)
- * Rail-to-Rail Input and Output
- * Slew Rate: 0.2V/µs (Typ.)

ORDERING INFORMATION

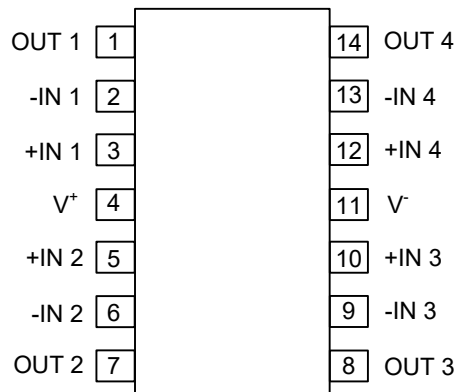
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV4347L-P14-R	ULV4347G-P14-R	TSSOP-14	Tape Reel

<p>ULV4347G-P14-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel (2) P14: TSSOP-14 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



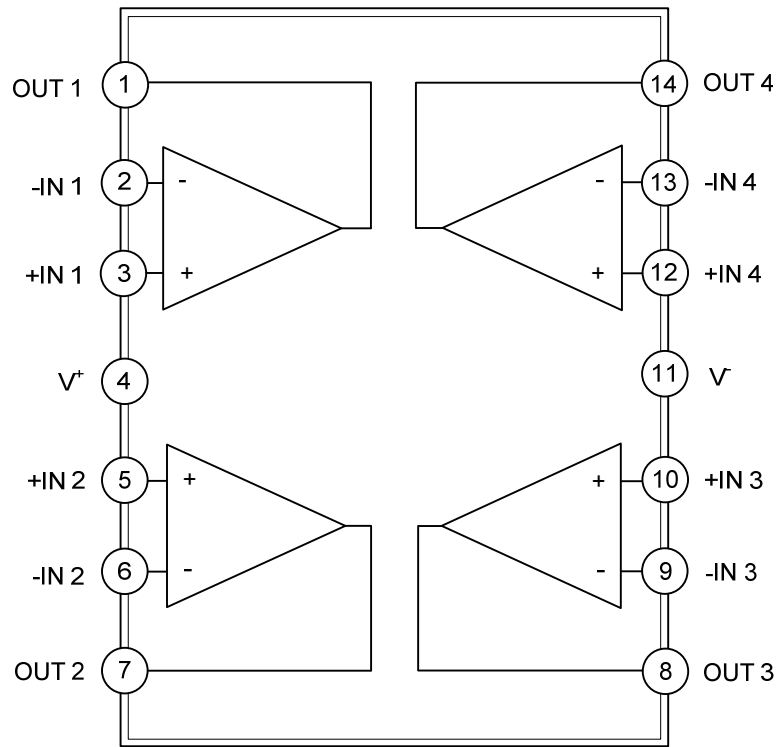
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT 1	Output of 1 AMP
2	-IN 1	Inverting input of 1 AMP
3	+IN 1	Non-inverting input of 1 AMP
4	V ⁺	Positive power supply
5	+IN 2	Non-inverting input of 2 AMP
6	-IN 2	Inverting input of 2 AMP
7	OUT 2	Output of 2 AMP
8	OUT 3	Output of 3 AMP
9	-IN 3	Inverting input of 3 AMP
10	+IN 3	Non-inverting input of 3 AMP
11	V ⁻	Negative power supply
12	+IN 4	Non-inverting input of 4 AMP
13	-IN 4	Inverting input of 4 AMP
14	OUT 4	Output of 4 AMP

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+ - V^-$	7	V
Voltage at Input or Output Pin		$V^- - 0.5 \sim V^+ + 0.5$	V
Current at Input Pin	I_i	10	mA
Output Short-Circuit (Note 2)		Continuous	
Junction Temperature	T_J	+150	°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.

- 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.
- Short-circuit to ground, one amplifier per package.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	110	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+ - V^-$	2.5 ~ 5.5	V
Operating Free-Air Temperature	T_{OPR}	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$, $V^+ = 2.5 \sim 5.5\text{V}$, $V^- = 0\text{V}$, $V_{IC} = V^+/2\text{V}$, and $R_L = 100\text{k}\Omega$, unless otherwise noted)

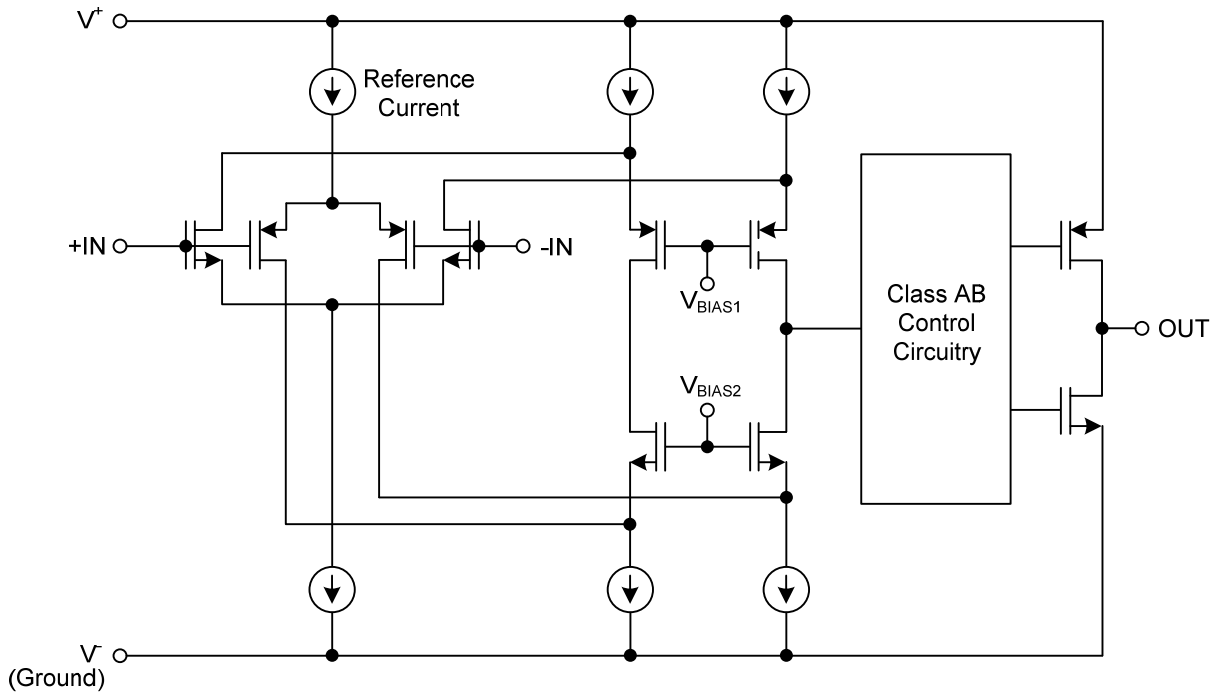
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current/Amplifier	I_Q	$I_O = 0$		20	34	μA
Power Supply Rejection Ratio	PSRR	$V^+ = 2.5\text{V} \sim 5.5\text{V}$, $V_{IC} < V^+ - 1.7\text{V}$	56	80		dB
Input Offset Voltage	V_{OS}	$V^+ = 5.5\text{V}$, $V_{IC} = V^- + 0.8\text{V}$		2	8	mV
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$			10		$\mu\text{V}/^\circ\text{C}$
Input Bias Current	I_B			± 1		pA
Input Offset Current	I_{OS}			± 1		pA
Common-Mode Voltage Range	V_{CM}		$V^- - 0.2$		$V^+ + 0.2$	V
Common-Mode Rejection Ratio	CMRR	$V^+ = 5.5\text{V}$, $V^- - 0.2\text{V} < V_{IC} < V^+ - 1.7\text{V}$	68	80		dB
		$V^+ = 5.5\text{V}$, $V^- - 0.2\text{V} < V_{IC} < (V^+) + 0.2\text{V}$	52	70		dB
Channel Separation, DC				0.3		$\mu\text{V}/\text{V}$
		$f = 1\text{kHz}$		128		dB

■ ELECTRICAL CHARACTERISTICS (Cont.)

(T_A = 25°C, V⁺ = 2.5~ 5.5V, V⁻ = 0V, V_{IC} = V⁺/2 V, and R_L = 100kΩ, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Large Signal Voltage Gain	A _v	V ⁺ = 5.5V, R _L = 100kΩ, 0.015V < V _O < 5.485V	60	105		dB	
		V ⁺ = 5.5V, R _L = 5kΩ, 0.125V < V _O < 5.375V	60	105		dB	
Output Voltage	V _O	R _L = 100kΩ	V _{OH}	V ⁺ - 0.015	V ⁺ - 0.005	V	
			V _{OL}		0.005	0.015	V
		R _L = 5kΩ	V _{OH}	V ⁺ - 0.125	V ⁺ - 0.09		V
			V _{OL}		0.09	0.125	V
Short-Circuit Current	I _{SC}			±11		mA	
Slew Rate	SR	G = +1, C _L = 100pF		0.2		V/μs	
Gain-Bandwidth Product	GBW	C _L = 100pF		580		kHz	
Settling Time	t _s	0.1%, V _S = 5V, 2V Step, G = +1		21		μs	
		0.01%, V _S = 5V, 2V Step, G = +1		27		μs	
Overload Recovery Time		V _{IN} × Gain = V _S		23		μs	
Input Voltage Noise		f = 0.1Hz ~ 10Hz		14		μV _{P-P}	
Input Voltage Noise Density	e _n	f = 1kHz		60		nV/ √ Hz	
Input Current Noise Density	i _n	f = 1kHz		0.7		fA/√ Hz	

■ SIMPLIFIED SCHEMATIC



■ TYPICAL APPLICATION CIRCUIT

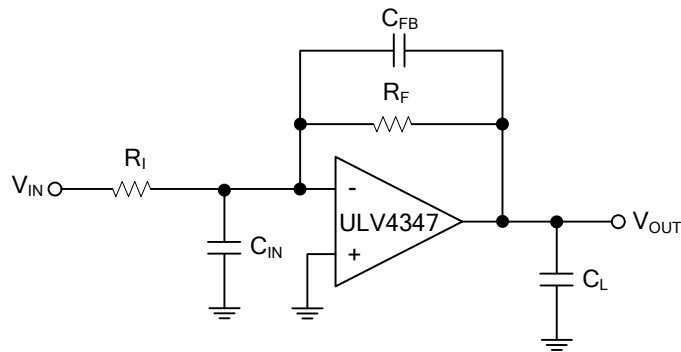


Figure 1. Adding a Feedback Capacitor In the Unity-Gain Inverter Configuration Improves Capacitive Load.

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