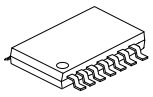
MICROPOWER, RAIL-TO-RAIL OPERATIONAL AMPLIFIERS



TSSOP-14

■ 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.

■ FEATURES

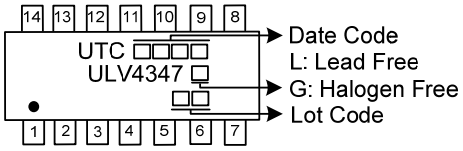
* Supply Voltage:2.5~5.5V
* Supply Current/Amplifier:34 μA (Max)
* Input Offset Voltage:8mV (Max)
* Rail-to-Rail Input and Output
* Slew Rate: 0.2V/μs (Typ.)

■ ORDERING INFORMATION

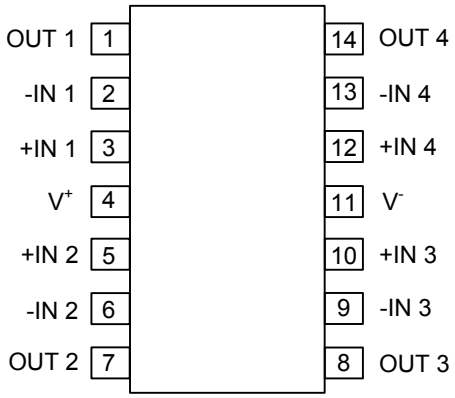
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV4347L-P14-R	ULV4347G-P14-R	TSSOP-14	Tape Reel

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

■ MARKING



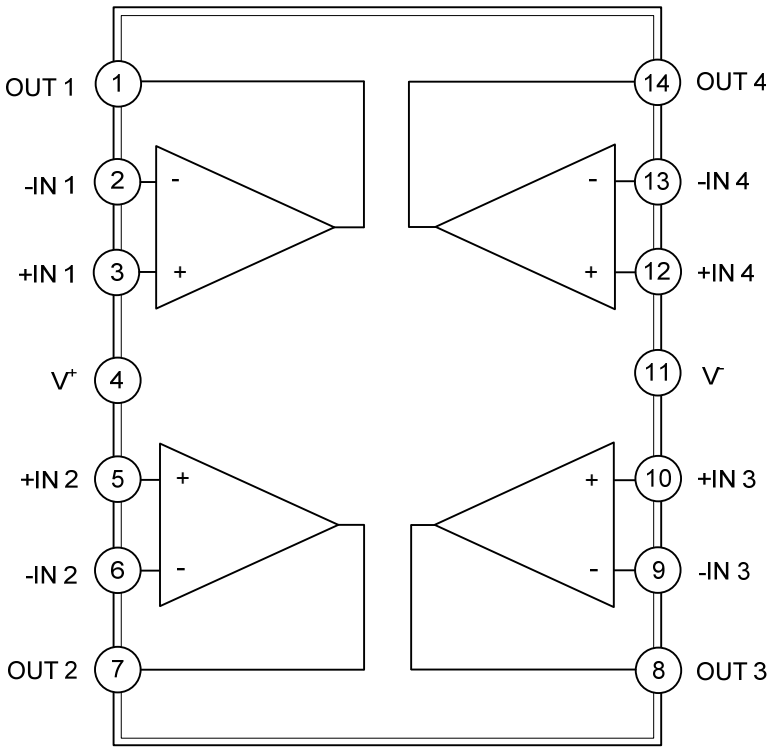
■ PIN CONFIGURATION



■ 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.
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	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°C, V^+=2.5~ 5.5V. V^-= 0V, V_{IC} = $V^+/2$ V, and R_L=100kΩ, unless otherwise noted)

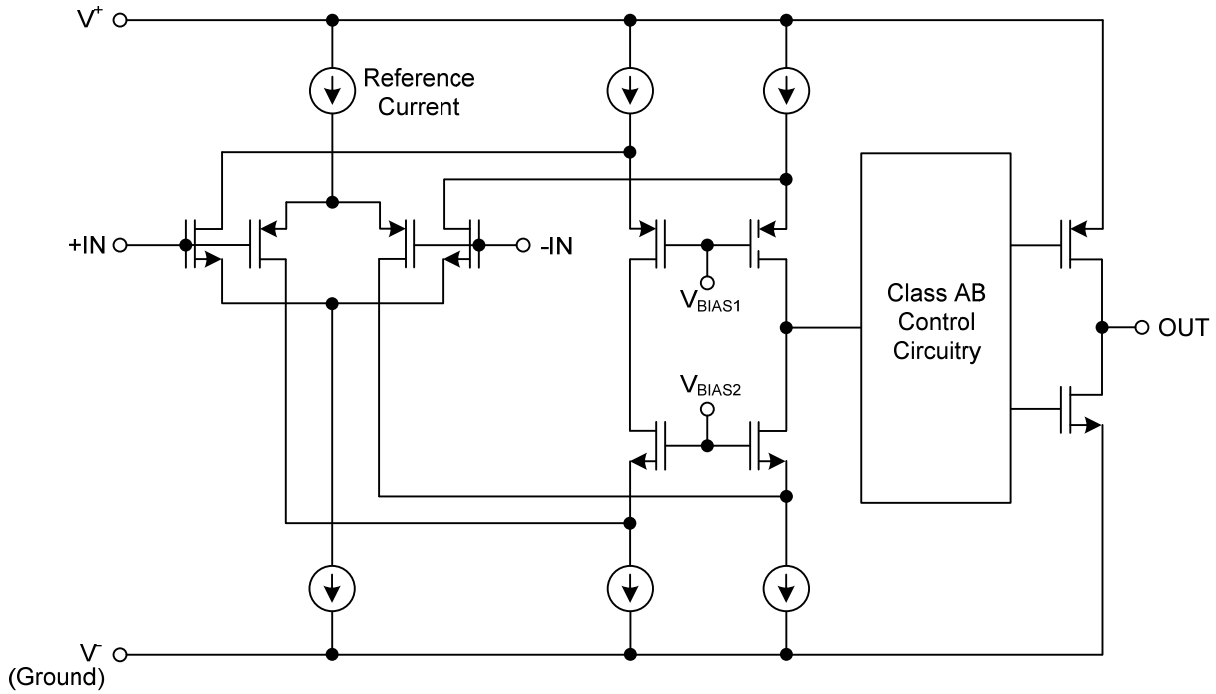
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current/Amplifier	I_Q	I_O = 0		20	34	μA
Power Supply Rejection Ratio	PSRR	V^+=2.5V~5.5V, V_{IC} < V^+ - 1.7V	56	80		dB
Input Offset Voltage	V_{OS}	V^+=5.5V, V_{IC}= V^- + 0.8V		2	8	mV
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$			10		μV/°C
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^+=5.5V,V^--0.2V<V_{IC}< V^+- 1.7V	68	80		dB
		V^+=5.5V, V^--0.2V<V_{IC}<(V+)+0.2V	52	70		dB
Channel Separation, DC				0.3		μV/V
		f=1kHz		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		$nV/\sqrt{Hz}$
Input Current Noise Density	i_n	f = 1kHz			0.7		$fA/\sqrt{Hz}$

■ SIMPLIFIED SCHEMATIC



■ TYPICAL APPLICATION CIRCUIT

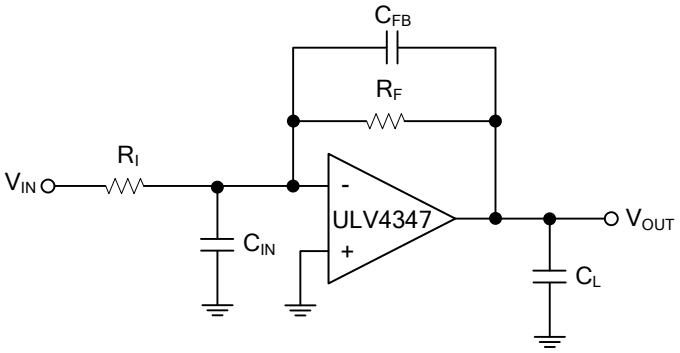


Figure 1. Adding a Feedback Capacitor In the Unity-Gain Inverter Configuration Improves Capacitative Load.