UNISONIC TECHNOLOGIES CO., LTD

ULV8542   Preliminary   *CMOS IC*

1.1MHz, 42µA   RAIL-TO-RAIL I/O CMOS DUAL AMPS

MSOP-8

■ DESCRIPTION

The UTC **ULV8542** is a low cost rail to rail input and output dual OP AMP, Features in a wide input common-mode voltage range and output voltage swing. The minimum operating supply voltage down to 2.1V and the maximum recommended supply voltage is 5.5V. The operating temperature range extended -40°C to +125°C.

UTC **ULV8542** suit for piezoelectric sensors, integrators, and photodiode amplifiers based on very low input bias currents of 0.5pA. Rail-to-rail inputs and outputs are useful to design buffering ASIC in single-supply systems.

The common applications for this device especially in very low power systems such as safety monitoring, portable equipment.
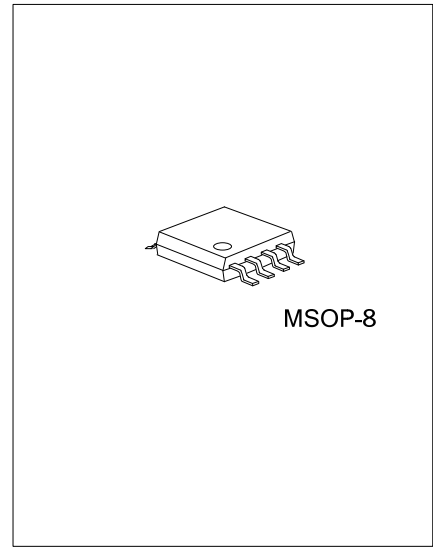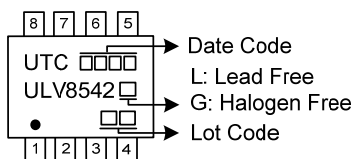
■ FEATURES

* Low Cost
* Operating voltage range:2.1V~ 5.5V
* Low offset voltage:0.8mV Typical
* Very low input bias currents: 0.5pA
* Rail-to-Rail Input and Output
* Unity Gain Stable
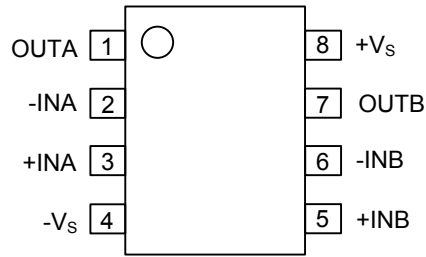* Gain Bandwidth Product: 1.1MHz

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV8542L-SM1-R	ULV8542G-SM1-R	MSOP-8	Tape Reel

ULV8542G-SM1-R

(1)Packing Type   (1) R: Tape Reel

(2)Package Type   (2) SM1: MSOP-8

(3)Green Package   (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

UTC ▢▢▢▢ → Date Code

ULV8542▢
- L: Lead Free
- G: Halogen Free

→ Lot Code

■ PIN CONFIGURATION

QW-R105-054.a

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OUTA  1  ◯      8  +Vs
-INA  2         7  OUTB
+INA  3         6  -INB
-Vs   4         5  +INB
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■ 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 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 supply

■ BLOCK DIAGRAM
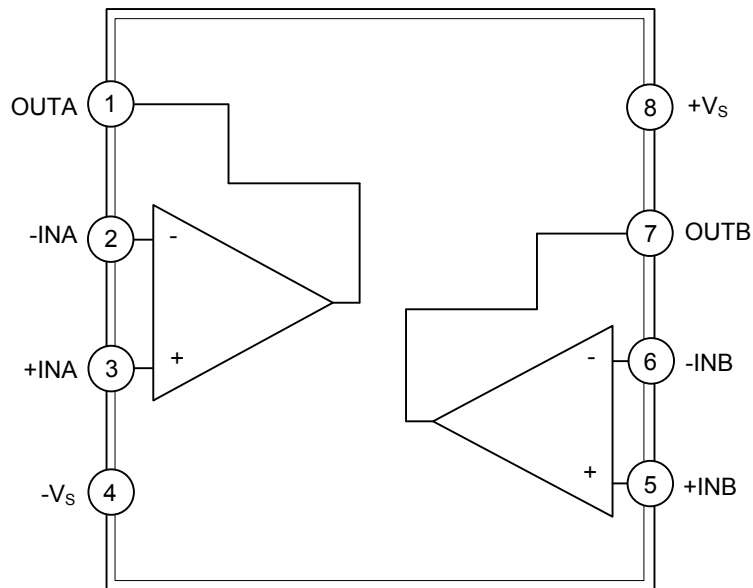
■ **ABSOLUTE MAXIMUM RATING**

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage, Vs to -Vs	V_S	7.5	V
Common-Mode Input Voltage	V_{CM}	$(-V_S)-0.5 \sim (+V_S)+0.5$	V
Junction Temperature	T_J	+150	°C
Operating Temperature Range	T_{OPR}	-40 ~ +125	°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.

■ **ELECTRICAL CHARACTERISTICS**

(V_S=+5V, R_L=100kΩ connected to Vs/2,and V_{OUT}=Vs/2, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS						
Input Offset Voltage	V_{OS}			±0.8	±3.5	mV
		(Note)			±5.4	mV
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta_T$			2.7		µV/°C
Input Bias Current	I_B			0.5		pA
Input Offset Current	I_{OS}			0.5		pA
Common-Mode Voltage Range	V_{CM}	V_S=5.5V	-0.1		5.6	V
Common-Mode Rejection Ratio	CMRR	V_S=5.5V, V_{CM}=- 0.1V~4V	72	88		dB
		(Note)	72			dB
		V_S=5.5V, V_{CM}=-0.1V~5.6V	60	78		dB
		(Note)	57			dB
Open-Loop Voltage Gain	A_{OL}	R_L=5KΩ, Vo=0.1V~4.9V	80	90		dB
		(Note)	78			dB
		R_L=100KΩ, Vo=0.035V~4.965V	85	94		dB
		(Note)	82			dB
OUTPUT CHARACTERISTICS						
Output Voltage Swing from Rail	V_O	R_L=100KΩ		0.008		V
Output Current	I_{OUT}		20	23		mA
		(Note)	18			mA
POWER SUPPLY						
Operating Voltage Range	V_S		2.1		5.5	V
		(Note)	2.5		5.5	V
Power Supply Rejection Ratio	PSRR	V_S=+2.5V~+5.5V V_{CM}=(-V_S)+0.5V	76	92		dB
			70 (Note)			dB
Quiescent Current / Amplifier	I_Q	I_{OUT}=0		70	90	µA
		(Note)			100	µA
DYNAMIC PERFORMANCE (C_L=100pF)						
Gain-Bandwidth Product	GBP			1.1		MHz
Slew Rate	SR	G=+1, 2V Output Step		0.8		V/µs
Settling Time to 0.1%	t_S	G=+1, 2 V Output Step		5.3		µs
Overload Recovery Time	t_{OR}	V_{IN} ·Gain=Vs		2.6		µs
NOISE PERFORMANCE						
Voltage Noise Density	e_N	f=1kHz		27		nV/$\sqrt{Hz}$
		f=10kHz		20		nV/$\sqrt{Hz}$

Note: Denotes the specifications which apply over the operating temperature range (-40°C~125°C).
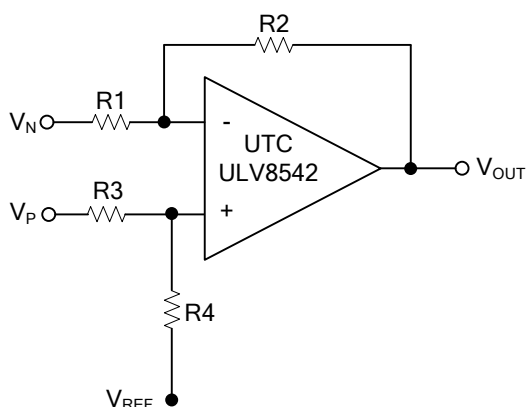
■ **TYPICAL APPLICATION CIRCUIT**

Figure 1. Differential Amplifier

Note: Figure 1 is the differential amplifier. $V_{OUT}=(V_P-V_N) \times R2/R1+Vref$ (when R4/R3=R2/R1).
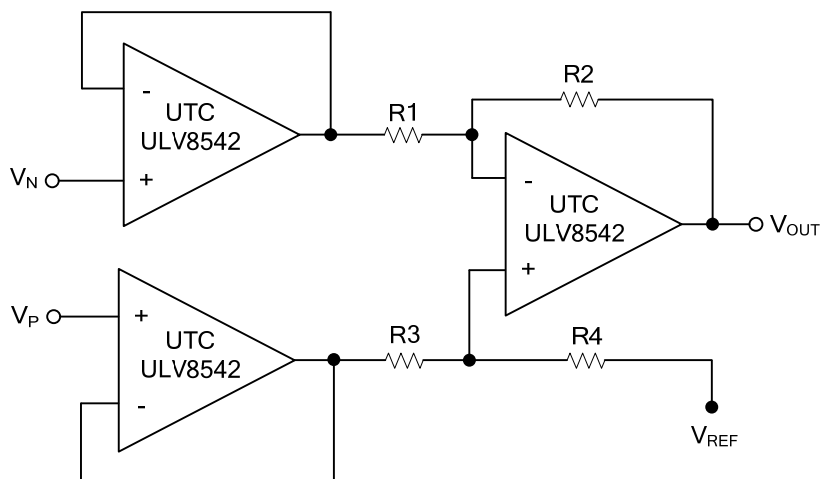

Figure 2. Instrumentation Amplifier

Note: The circuit in Figure 2 performs the same function as that in Figure 1 but with the high input impedance.
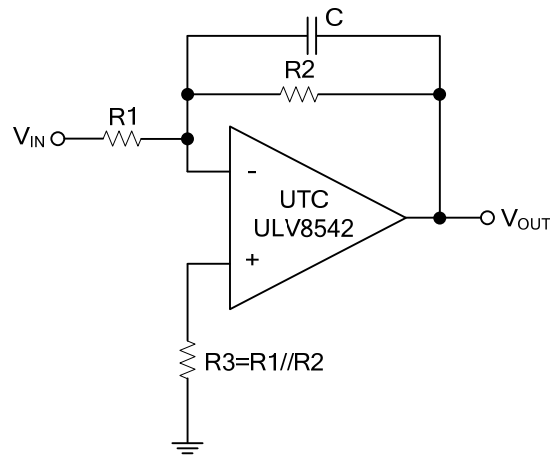
■ **TYPICAL APPLICATION CIRCUIT (Cont.)**

Figure 3. Low Pass Active Filter

Note: Figure 3 is the low pass filter. It's DC gain is -R2/R1 and the -3dB corner frequency is $1/2\pi R_2 C$.