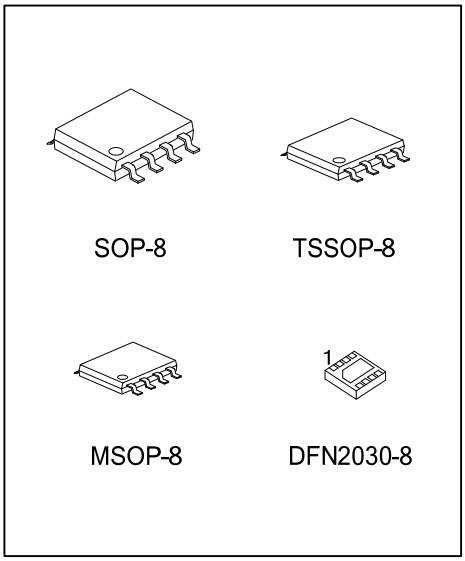
ULV8542

CMOS IC

1.1MHz RAIL-TO-RAIL I/O CMOS DUAL AMPS



■ 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
  ULV8542: ±3.5mV (Max.)
  ULV8542-A: ±1.6mV (Max.)
* Very low input bias currents: 0.5pA
* Rail-to-Rail Input and Output
* Unity Gain Stable
* Gain Bandwidth Product: 1.1MHz

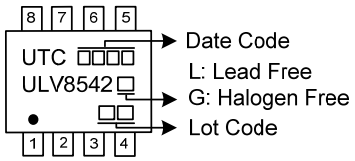
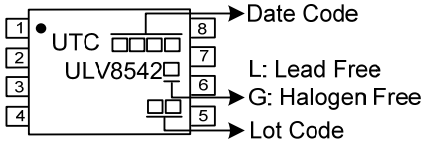
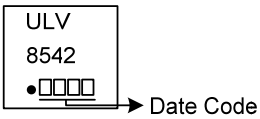
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV8542L-S08-R	ULV8542G-S08-R	SOP-8	Tape Reel
ULV8542L-SM1-R	ULV8542G-SM1-R	MSOP-8	Tape Reel
ULV8542L-P08-R	ULV8542G-P08-R	TSSOP-8	Tape Reel
ULV8542L-K08-2030-R	ULV8542G-K08-2030-R	DFN2030-8	Tape Reel
ULV8542L-A-S08-R	ULV8542G-A-S08-R	SOP-8	Tape Reel
ULV8542L-A-SM1-R	ULV8542G-A-SM1-R	MSOP-8	Tape Reel
ULV8542L-A-P08-R	ULV8542G-A-P08-R	TSSOP-8	Tape Reel
ULV8542L-A-K08-2030-R	ULV8542G-A-K08-2030-R	DFN2030-8	Tape Reel

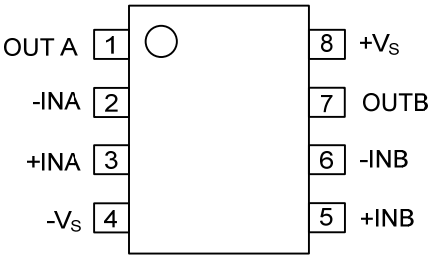
ULV8542G-A-S08-R
(1)Packing Type
(2)Package Type
(3)Input Offset Voltage
(4)Green Package

(1) R: Tape Reel
(2) S08: SOP-8, SM1: MSOP-8, P08: TSSOP-8
K08-2030: DFN2030-8
(3) Refer to ELECTRICAL CHARACTERISTICS
(4) G: Halogen Free and Lead Free, L: Lead Free

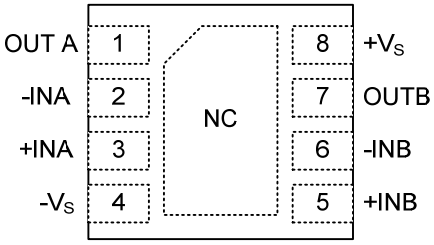
■ MARKING

PACKAGE	MARKING
SOP-8 / MSOP-8	
TSSOP-8	
DFN2030-8	

■ PIN CONFIGURATION



SOP-8 / MSOP-8 / TSSOP-8

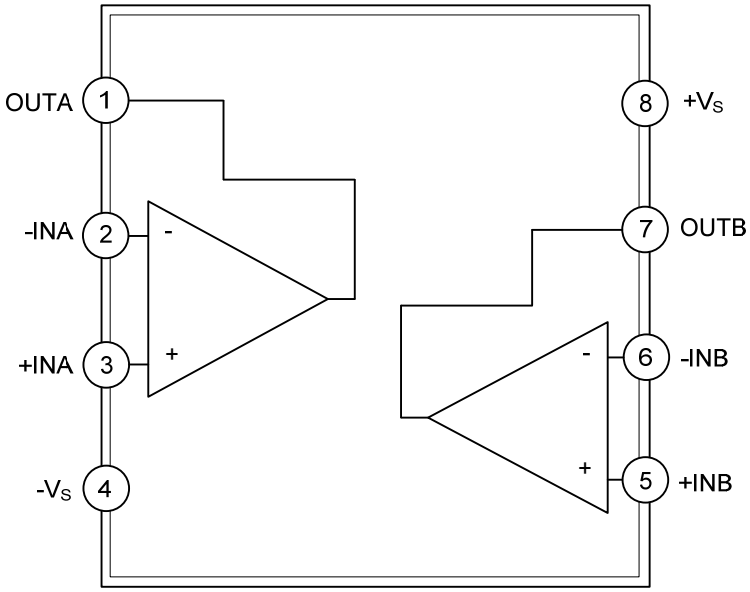


DFN2030-8
(Top View)

■ PIN DESCRIPTION

PIN NO.		PIN NAME	DESCRIPTION
SOP-8 MSOP-8 TSSOP-8	DFN2030-8		
1	1	OUTA	Output pin of A AMP
2	2	-INA	Invert input pin of A AMP
3	3	+INA	Non-invert input of A AMP
4	4	$-V_S$	Negative supply
5	5	+INB	Non-invert input of B AMP
6	6	-INB	Invert input pin of B AMP
7	7	OUTB	Output pin of B AMP
8	8	$+V_S$	Positive supply
-	Exposed Pad	NC	Connect exposed pad to $-V_S$.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage, Vs to -Vs	V_S	7	V
Common-Mode Input Voltage	V_{CM}	$(-V_S)$-0.5 ~ $(+V_S)$+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 V_S / 2, and V_{OUT}=V_S / 2, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS						
Input Offset Voltage	V_{OS}	**ULV8542**			±3.5	mV
		ULV8542-A			±1.6	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
		V_S=5.5V, V_{CM}=-0.1V ~ 5.6V	60	78		dB
Open-Loop Voltage Gain	A_{OL}	R_L=5KΩ, V_O=0.1V ~ 4.9V	80	90		dB
		R_L=100KΩ, V_O=0.035V ~ 4.965V	85	94		dB
OUTPUT CHARACTERISTICS						
Output Voltage Swing from Rail	V_O	R_L=100KΩ		0.008		V
Output Current	I_{OUT}		20	23		mA
POWER SUPPLY						
Operating Voltage Range	V_S		2.1		5.5	V
Power Supply Rejection Ratio	PSRR	V_S=+2.5V ~ +5.5V V_{CM}=$(-V_S)$+0.5V	76	92		dB
Quiescent Current / Amplifier	I_Q	I_{OUT}=0		70	120	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=V_S		2.6		μs
NOISE PERFORMANCE						
Voltage Noise Density	e_N	f=1kHz		27		nV/$\sqrt{Hz}$
		f=10kHz		20		nV/$\sqrt{Hz}$

■ TYPICAL APPLICATION CIRCUIT

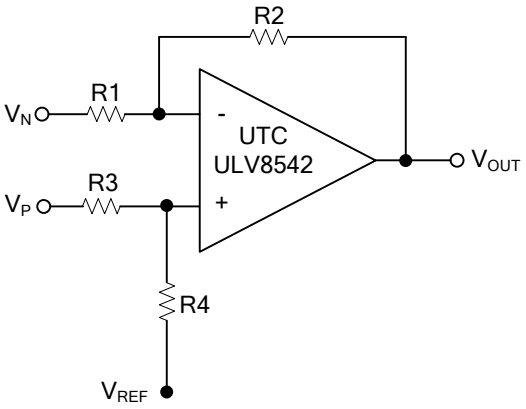


Figure 1. Differential Amplifier

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

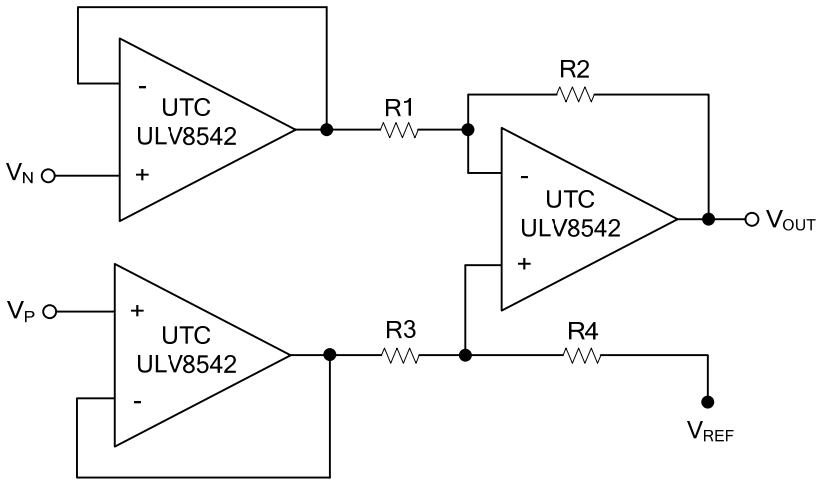


Figure 2. Instrumentation Amplifier

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.)

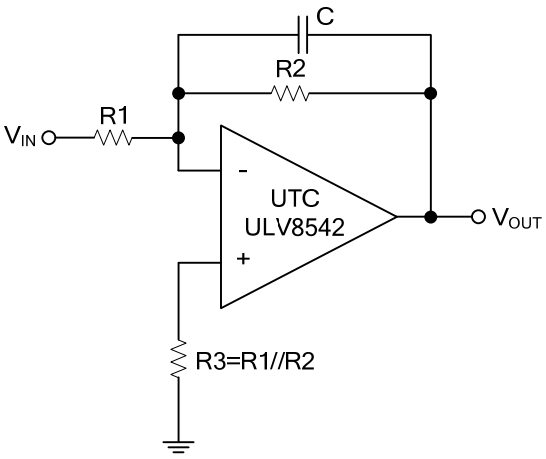
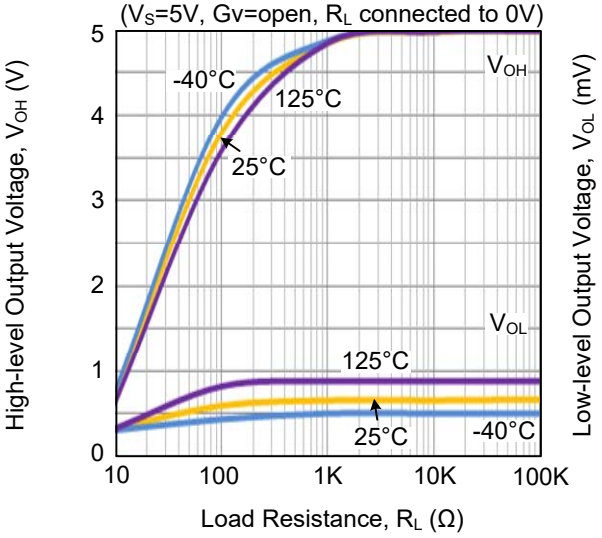


Figure 3. Low Pass Active Filter

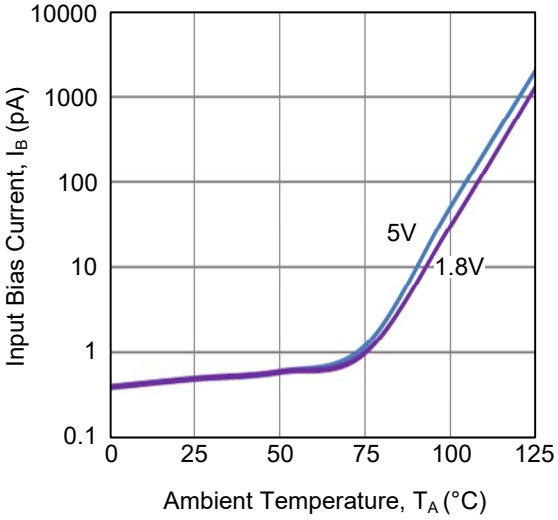
Note: Figure 3 is the low pass filter. It's DC gain is -R2/R1 and the -3dB corner frequency is $1/2\pi R_2C$.

■ TYPICAL CHARACTERISTICS

Maximum Output Voltage vs. Load Resistance
(V_S=5V, Gv=open, R_L connected to 0V)



Input Bias Current vs. Temperature
(V_{CM}=V_S/2)



Noise Voltage Density vs. Frequency