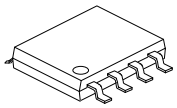
1.7V, 500nA, RAIL-TO-RAIL INPUT/OUTPUT, NANOPOWER OPERATIONAL AMPLIFIER



SOP-8

■ DESCRIPTION

The UTC **ULV8562** ultra-low-power operational amplifier (op amps) is intended for cost-optimized sensing applications in wireless and low-power wired equipment. The UTC **ULV8562** family of op amps minimizes power consumption in equipment such as motion detecting security systems where operational battery life is critical. It also has a carefully designed CMOS input stage, enabling very low, femto-ampere bias currents, thereby reducing I_{BIAS} and I_{OS} errors that would otherwise impact sensitive applications. Examples of these include transimpedance amplifier configurations with megaohm feedback resistors, and high source impedance sensing applications. Additionally, built-in EMI protection reduces sensitivity to unwanted RF signals from sources such as mobile phones, WiFi, radio transmitters and tab readers.

■ FEATURES

* Wide Supply Range: 1.7V~3.6V
* Nanopower Supply Current: 500nA per Channel
* Rail-to-Rail Input and Output (RRIO)
* Offset Voltage: 3.1mV (maximum)
* Gain Bandwidth: 8kHz
* Unity-Gain Stable
* Low Input-Bias Current: 100pA

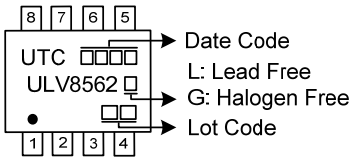
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV8562L-S08-R	ULV8562G-S08-R	SOP-8	Tape Reel

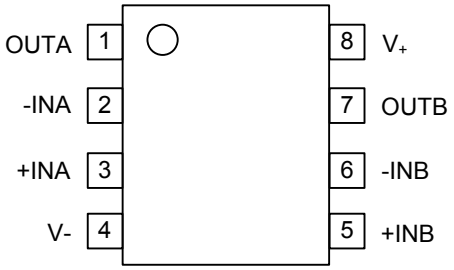
ULV8562G-S08-R

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

■ MARKING



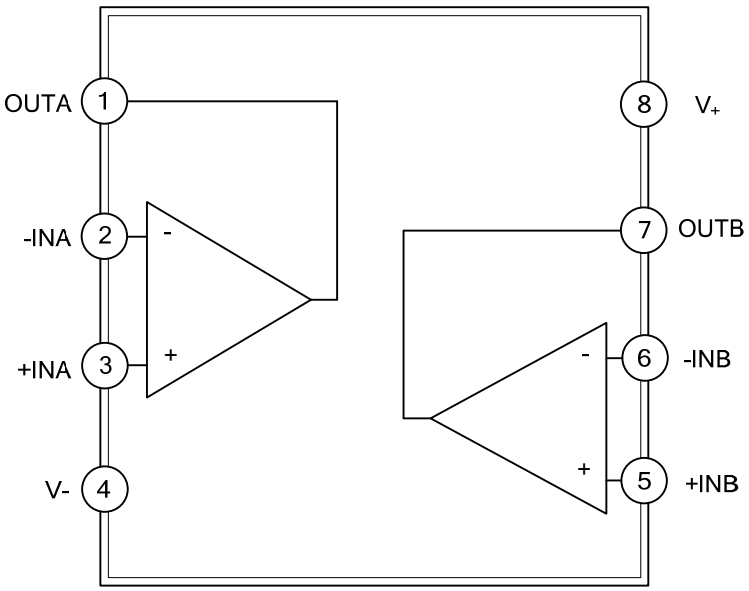
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUTA	Output pin of A AMP
2	-INA	Inverting input pin of A AMP
3	+INA	Non-Inverting input of A AMP
4	V-	Negative power supply
5	+INB	Non-Inverting input of B AMP
6	-INB	Inverting input pin of B AMP
7	OUTB	Output pin of B AMP
8	V_+	Positive power supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

[Over operating free-air temperature range (unless otherwise specified.) (Note 1, 2))

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage, Vs= (V+) - (V-)			-0.3 ~ 4	V
Input pins Voltage	Common Mode		(V-) - 0.3~ (V+) + 0.3	V
	Differential		(V-) - 0.3~ (V+) + 0.3	V
Input pins Current			-10 ~ 10	mA
Output Short Current (Note 3)			Continuous	
Operating Ambient Temperature			-40 ~ +125	°C
Junction Temperature		T_J	+150	°C
Storage Temperature Range		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 0.3V beyond the supply rails must be current-limited to 10mA or less.
3. Short-circuit to ground.

■ RECOMMENDED OPERATING CONDITIONS

[Over operating free-air temperature range (unless otherwise specified.)]

PARAMETER	SYMBOL	RATINGS	UNIT
Specified Voltage (V+ - V-)		1.7~ 3.6	V
Specified Ambient Temperature		-40 ~ +125	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	141.6	°C/W
Junction to Case	θ_{JC}	85.7	°C/W

■ ELECTRICAL CHARACTERISTICS

(V_S=1.8V~3.3V, V_{CM}= V_{OUT} = V_S/ 2, and R_L≥ 10MΩ to V_S / 2, T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFFSET VOLTAGE						
Input Offset Voltage	V_{OS}	V_{CM} = V- , V_S = 1.8V and 3.3V	-3.1		3.1	mV
		V_{CM} = V+, V_S = 1.8V and 3.3V	-3.4		3.4	mV
Input Offset Drift	dV_{OS}/dT	V_{CM} = V-, T_A = -40°C~125°C		0.8		μV/°C
Power-Supply Rejection Ratio	PSRR	V_{CM} = V- , V_S = 1.8V and 3.3V	66	90		dB
INPUT VOLTAGE RANGE						
Common-Mode Voltage Range	V_{CM}	V_S = 3.3V	0		3.3	V
Common-Mode Rejection Ratio	CMRR	(V-) ≤ V_{CM} ≤ (V+), V_S=3.3V	60	80		dB
		(V-) ≤ V_{CM} ≤ (V+) - 1.2V		90		dB
INPUT BIAS CURRENT						
Input Bias Current	I_B			1		pA
Input Offset Current	I_{OS}			1		pA
INPUT IMPEDANCE						
Differential				2		pF
Common Mode				4		pF
Noise						
Input Voltage Noise	E_n	f = 0.1Hz~10Hz		8.6		$μV_{P-P}$
Input Voltage Noise Density	e_n	f = 1kHz		264		$nV/\sqrt{Hz}$
OPEN-LOOP GAIN						
Open-Loop Voltage Gain	A_{OL}	(V-) + 0.3 V ≤ V_O ≤ (V+) - 0.3 V, R_L =100kΩ to V^+/2		100		dB
OUTPUT						
Voltage Output Swing from Positive Rail	V_{OH}	R_L =100kΩ to V^+/2, V_S = 3.3V			12	mV
Voltage Output Swing from Negative Rail	V_{OL}	R_L =100kΩ to V^+/2, V_S = 3.3 V			12	mV
Short-Circuit Current	I_{SC}	Sourcing, V_O to V-, $V_{IN(diff)}$ = 100mV, V_S =3.3V		15		mA
		Sinking, V_O to V+, $V_{IN(diff)}$ = -100mV, V_S =3.3V		30		mA
Open Loop Output Impedance	Z_O	f =1kHz, I_O = 0mA		8		kΩ
FREQUENCY RESPONSE						
Gain-Bandwidth Product	GBP	C_L = 20pF, R_L = 10MΩ		8		kHz
Slew Rate (10% to 90%)	SR	G =1, Rising Edge, C_L = 20pF		3.5		V/ms
		G =1, Falling Edge, C_L = 20pF		4.5		V/ms
POWER SUPPLY						
Quiescent Current, Per Channel	I_Q	V_{CM}= V-, I_O = 0mA, V_S = 3.3V		550	640	nA