



L6142

Preliminary

LINEAR INTEGRATED CIRCUIT

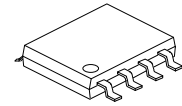
17 MHz RAIL-TO-RAIL INPUT-OUTPUT DUAL OPERATIONAL AMPLIFIERS

DESCRIPTION

The UTC **L6142** provides new levels of performance in applications where low voltage supplies or power limitations previously made compromise necessary. Operating on supplies of 2.7V to over 24V, the UTC **L6142** is an excellent choice for battery operated systems, portable instrumentation and others.

The greater than rail-to-rail input voltage range eliminates concern over exceeding the common-mode voltage range. The rail-to-rail output swing provides the maximum possible dynamic range at the output. This is particularly important when operating on low supply voltages.

High gain-bandwidth with 450µA/Amplifier supply current opens new battery powered applications where previous higher power consumption reduced battery life to unacceptable levels. The ability to drive large capacitive loads without oscillating functionally removes this common problem.



SOP-8

FEATURES

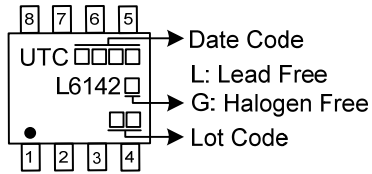
- * For 5V supply, Typ. unless noted
- * Rail-to-rail Input : -0.25V~5.25V
- * Rail-to-Rail Output : 0.005V~4.995V
- * Slew Rate:
 - Small Signal, 5V/µs
 - Large Signal, 30V/µs
- * Low Supply Current 450µA/Amplifier
- * Wide Supply Range: 2.7V~24V
- * Gain 108dB with $R_L=10k$

ORDERING INFORMATION

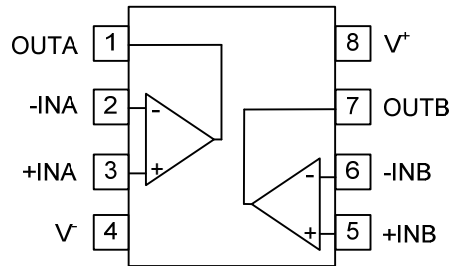
Ordering Number		Package	Packing
Lead Free	Halogen Free		
L6142L-S08-R	L6142G-S08-R	SOP-8	Tape Reel

<p>L6142G-S08-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	--

■ MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUTA	Output (op amp A)
2	-INA	Inverting Input (op amp A)
3	+INA	Non-inverting Input (op amp A)
4	V ⁻	Negative Power Supply
5	+INB	Non-inverting Input (op amp B)
6	-INB	Inverting Input (op amp B)
7	OUTB	Output (op amp B)
8	V ⁺	Positive Power Supply

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Differential Input Voltage		15	V
Voltage at Input/Output Pin		$(V^+) + 0.3, (V^-) - 0.3$	V
Supply Voltage ($V^+ - V^-$)		35	V
Current at Input Pin		± 10	mA
Current at Output Pin (Note 2)		± 25	mA
Current at Power Supply Pin		50	mA
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. Applies to both single-supply and split-supply operation. Continuous short circuit operation at elevated ambient temperature can result in exceeding the maximum allowed junction temperature of 150°C.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V^+		2.7		24	V
Temperature Range	T_A		-40		+85	°C

■ 5V DC ELECTRICAL CHARACTERISTICS (Note 1)

(Unless otherwise specified, all limits guaranteed for $T_A = 25^\circ\text{C}$, $V^+ = 5.0\text{V}$, $V^- = 0\text{V}$, $V_{CM} = V_O = V^+/2$ and $R_L > 1\text{M}\Omega$ to $V^+/2$.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 3)	TYP (Note 2)	MAX (Note 3)	UNIT	
Input Offset Voltage	V_{OS}	$T_A = 25^\circ\text{C}$		0.3	3.3	mV	
Input Bias Current	I_B			170		nA	
		$0\text{V} \leq V_{CM} \leq 5\text{V}$		180	526	nA	
Input Offset Current	I_{OS}			3	80	nA	
Input Resistance, CM	R_{IN}			126		M Ω	
Common-Mode Rejection Ratio	CMRR	$0\text{V} \leq V_{CM} \leq 4\text{V}$	78	107		dB	
		$0\text{V} \leq V_{CM} \leq 5\text{V}$	64	82		dB	
Power Supply Rejection Ratio	PSRR	$5\text{V} \leq V^+ \leq 24\text{V}$	78	87		dB	
Input Common-Mode Voltage Range	V_{CM}			-0.25 ~5.25		V	
Large Signal Voltage Gain	A_V	$R_L = 10\text{k}$	20	100		V/mV	
Output Swing	V_{OH}	$R_L = 100\text{k}$	4.93	4.995		V	
		$R_L = 10\text{k}$		4.97		V	
		$R_L = 2\text{k}$	4.8	4.9		V	
	V_{OL}	$R_L = 100\text{k}$		0.005	0.013		V
		$R_L = 10\text{k}$		0.02			V
		$R_L = 2\text{k}$		0.06	0.133		V
Output Short Circuit Current	I_{SC}	Sourcing	4	13		mA	
		Sinking	4	5		mA	
Supply Current	I_S	Per Amplifier		450	880	μA	

- Notes: 1. Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that $T_J = T_A$. No guarantee of parametric performance is indicated in the electrical tables under conditions of the internal self heating where $T_J > T_A$.
 2. All voltage values, except differential voltage, are with respect to network ground terminal.
 3. Typical values represent the most likely parametric norm.
 4. All limits are guaranteed by testing or statistical analysis.
 5. Input current must be limited by a resistor in series with the inputs.

■ 5V AC ELECTRICAL CHARACTERISTICS (Note 1)

(Unless otherwise specified, all limits guaranteed for $T_A = 25^\circ\text{C}$, $V^+ = 5.0\text{V}$, $V^- = 0\text{V}$, $V_{CM} = V_O = V^+/2$ and $R_L > 1\text{M}\Omega$ to $V^+/2$.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 3)	TYP (Note 2)	MAX	UNIT
Slew Rate	SR	$8 V_{PP} @ V^+ 12\text{V}$, $R_S > 1\text{k}\Omega$	9	25		V/ μs
Gain-Bandwidth Product	GBW	$f = 50\text{kHz}$	6	17		MHz
Phase Margin	Φ_m			38		Deg
Amp-to-Amp Isolation				130		dB
Input-Referred Voltage Noise	e_n	$f = 1\text{kHz}$		16		nV/ $\sqrt{\text{Hz}}$
Input-Referred Current Noise	i_n	$f = 1\text{kHz}$		0.22		pA/ $\sqrt{\text{Hz}}$
Total Harmonic Distortion	THD	$f = 10\text{kHz}$, $R_L = 10\text{k}\Omega$		0.003		%

- Notes: 1. Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that $T_J = T_A$. No guarantee of parametric performance is indicated in the electrical tables under conditions of the internal self heating where $T_J > T_A$.
2. Typical values represent the most likely parametric norm.
3. All limits are guaranteed by testing or statistical analysis.

■ 2.7V DC ELECTRICAL CHARACTERISTICS (Note 1)

(Unless otherwise specified, all limits guaranteed for $T_A = 25^\circ\text{C}$, $V^+ = 2.7\text{V}$, $V^- = 0\text{V}$, $V_{CM} = V_O = V^+/2$ and $R_L > 1\text{M}\Omega$ to $V^+/2$.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 3)	TYP (Note 2)	MAX (Note 3)	UNIT
Input Offset Voltage	V_{OS}			0.4	5	mV
Input Bias Current	I_B			150	526	nA
Input Offset Current	I_{OS}			4	80	nA
Input Resistance, C_M	R_{IN}			128		M Ω
Common-Mode Rejection Ratio	CMRR	$0\text{V} \leq V_{CM} \leq 1.8\text{V}$		90		dB
		$0\text{V} \leq V_{CM} \leq 2.7\text{V}$		76		dB
Power Supply Rejection Ratio	PSRR	$3\text{V} \leq V^+ \leq 5\text{V}$		79		dB
Input Common-Mode Voltage Range	V_{CM}			-0.25~ 2.95		V
Large Signal Voltage Gain	A_V	$R_L = 10\text{k}$		55		V/mV
Output Swing	V_{OH}	$R_L = 100\text{k}\Omega$	2.25	2.67		V
	V_{OL}	$R_L = 100\text{k}\Omega$		0.019	0.112	V
Supply Current	I_S	Per Amplifier		510	880	μA

- Notes: 1. Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that $T_J = T_A$. No guarantee of parametric performance is indicated in the electrical tables under conditions of the internal self heating where $T_J > T_A$.
2. Typical values represent the most likely parametric norm.
3. All limits are guaranteed by testing or statistical analysis.

■ 2.7V AC ELECTRICAL CHARACTERISTICS (Note 1)

(Unless otherwise specified, all limits guaranteed for $T_A = 25^\circ\text{C}$, $V^+ = 2.7\text{V}$, $V^- = 0\text{V}$, $V_{CM} = V_O = V^+/2$ and $R_L > 1\text{M}\Omega$ to $V^+/2$.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 3)	TYP (Note 2)	MAX	UNIT
Gain-Bandwidth Product	GBW	$f = 50\text{kHz}$		9		MHz
Phase Margin	Φ_m			36		Deg
Gain Margin	G_m			6		dB

- Notes: 1. Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that $T_J = T_A$. No guarantee of parametric performance is indicated in the electrical tables under conditions of the internal self heating where $T_J > T_A$.
2. Typical values represent the most likely parametric norm.
3. All limits are guaranteed by testing or statistical analysis.

■ 24V ELECTRICAL CHARACTERISTICS (Note 1)

(Unless otherwise specified, all limits guaranteed for $T_A = 25^\circ\text{C}$, $V^+ = 24\text{V}$, $V^- = 0\text{V}$, $V_{CM} = V_O = V^+/2$ and $R_L > 1\text{M}\Omega$ to $V^+/2$.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 3)	TYP (Note 2)	MAX (Note 3)	UNIT
Input Offset Voltage	V_{OS}			1.3	4.8	mV
Input Bias Current	I_B			174		nA
Input Offset Current	I_{OS}			5		nA
Input Resistance, C_M	R_{IN}			288		$\text{M}\Omega$
Common-Mode Rejection Ratio	CMRR	$0\text{V} \leq V_{CM} \leq 23\text{V}$		114		dB
		$0\text{V} \leq V_{CM} \leq 24\text{V}$		100		dB
Power Supply Rejection Ratio	PSRR	$0\text{V} \leq V_{CM} \leq 24\text{V}$		87		dB
Input Common-Mode Voltage Range	V_{CM}			-0.25~ 24.25		V
Large Signal Voltage Gain	A_V	$R_L = 10\text{k}$		500		V/mV
Output Swing	V_{OH}	$R_L = 10\text{k}\Omega$	23.62	23.85		V
	V_{OL}	$R_L = 10\text{k}\Omega$		0.07	0.185	V
Supply Current	I_S	Per Amplifier		750	1150	μA
Gain-Bandwidth Product	GBW	$f = 50\text{kHz}$		18		MHz

- Notes: 1. Electrical Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that $T_J = T_A$. No guarantee of parametric performance is indicated in the electrical tables under conditions of the internal self heating where $T_J > T_A$.
2. Typical values represent the most likely parametric norm.
3. All limits are guaranteed by testing or statistical analysis.

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.