

Features

- Differential input range $\pm 2.3V$
- 150 MHz 3 dB bandwidth
- 400 V/ μs slewrate
- $\pm 5V$ supplies or single supply
- 50 mA minimum output current
- Output swing (100 Ω load) to within 1.5V of supplies
- Low power – 11 mA typical

Applications

- Twisted pair receiver
- Differential line receiver
- VGA over twisted pair
- ADSL/HDSL receiver
- Differential to single ended amplification.
- Reception of analog signals in a noisy environment.

Ordering Information

Part No.	Temp. Range	Package	Outline #
EL2142CN	-40°C to +85°C	8-pin DIP	MDP0031
EL2142CS	-40°C to +85°C	8-pin SOIC	MDP0027

General Description

The EL2142C is a very high bandwidth amplifier designed to extract the difference signal from noisy environments, and is thus primarily targeted for applications such as receiving signals from twisted pair lines, or any application where common mode noise injection is likely to occur.

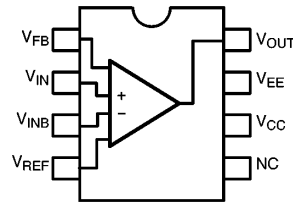
The EL2142C is stable for a gain of one, and requires two external resistors to set the voltage gain.

The output common mode level is set by the reference pin (V_{REF}), which has a -3 dB bandwidth of over 100 MHz. Generally, this pin is grounded, but it can be tied to any voltage reference.

The output can deliver a minimum of ± 50 mA and is short circuit protected to withstand a temporary overload condition.

Connection Diagrams

EL2142C SO, P-DIP



2142-1

Note: All information contained in this data sheet has been carefully checked and is believed to be accurate as of the date of publication; however, this data sheet cannot be a "controlled document". Current revisions, if any, to these specifications are maintained at the factory and are available upon your request. We recommend checking the revision level before finalization of your design documentation.

EL2142C

Differential Line Receiver

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Supply Voltage ($V_{CC}-V_{EE}$)	0V to 12.6V	Operating Junction Temperature	+150°C
Maximum Output Current	±60 mA	Lead Temperature (< 5 sec)	+300°C
Storage Temperature Range	-65°C to +150°C	Recommended Operating Temperature	-40°C to +85°C

Important Note:

All parameters having Min/Max specifications are guaranteed. The Test Level column indicates the specific device testing actually performed during production and Quality inspection. Elantec performs most electrical tests using modern high-speed automatic test equipment, specifically the LTX77 Series system. Unless otherwise noted, all tests are pulsed tests, therefore $T_J = T_C = T_A$.

Test Level	Test Procedure
I	100% production tested and QA sample tested per QA test plan QCX0002.
II	100% production tested at $T_A = 25^\circ\text{C}$ and QA sample tested at $T_A = 25^\circ\text{C}$, T_{MAX} and T_{MIN} per QA test plan QCX0002.
III	QA sample tested per QA test plan QCX0002.
IV	Parameter is guaranteed (but not tested) by Design and Characterization Data.
V	Parameter is typical value at $T_A = 25^\circ\text{C}$ for information purposes only.

DC Electrical Characteristics

($V_{CC} = +5\text{V}$, $V_{EE} = -5\text{V}$, $T_A = 25^\circ\text{C}$, $V_{IN} = 0\text{V}$, $R_L = 100$, unless otherwise specified)

Parameter	Description	Min	Typ	Max	Test Level	Units
V_{supply}	Supply Operating Range ($V_{CC}-V_{EE}$)	±3.0	±5.0	±6.3	I	V
I_S	Power Supply Current (no load)		11	14	I	mA
V_{OS}	Input Referred Offset Voltage	-25	10	40	I	mV
I_{IN}	Input Bias Current (V_{IN} , V_{INB} , V_{REF})	-20	6	20	I	μA
Z_{IN}	Differential Input Resistance		400		V	KΩ
C_{IN}	Differential Input Capacitance		1		V	pF
V_{DIFF}	Differential Input Range	±2.0	±2.3		I	V
A_{VOL}	Open Loop Voltage Gain		75		V	dB
V_{IN}	Input Common Mode Voltage Range	-2.6		+4.0	I	V
V_{OUT}	Output Voltage Swing (50Ω load to GND)	±2.9	±3.1		I	V
$I_{OUT(min)}$	Minimum Output Current	50	60		I	mA
V_N	Input Referred Voltage Noise		36		V	nV/√Hz
V_{REF}	Output Voltage Control Range	-2.5		+3.3	I	V
PSRR	Power Supply Rejection Ratio	60	70		I	dB
CMRR2	Input Common Mode Rejection Ratio ($V_{IN} = \pm 2\text{V}$)	60	70		I	dB
CMRR1	Input Common Mode Rejection Ratio (full V_{IN} range)	50	60		I	dB

EL2142C

Differential Line Receiver

AC Electrical Characteristics

($V_{CC} = +5V$, $V_{EE} = -5V$, $T_A = 25C$, $V_{IN} = 0V$, $R_{LOAD} = 100$, unless otherwise specified)

Parameter	Description	Min	Typ	Max	Test Level	Units
BW(-3dB)	-3 dB Bandwidth (Gain = 1)		150		V	MHz
SR	Slewrate		400		V	V/ μ s
T_{stl}	Settling time to 1%		15		V	ns
GBWP	Gain bandwidth product		200		V	MHz
$V_{REF}BW(-3\text{ dB})$	V_{REF} -3dB Bandwidth		130		V	MHz
$V_{REF}SR$	V_{REF} Slewrate		100		V	V/ μ sec
dG	Differential gain at 3.58 MHz.		0.2		V	%
d θ	Differential phase at 3.58 MHz.		0.2		V	

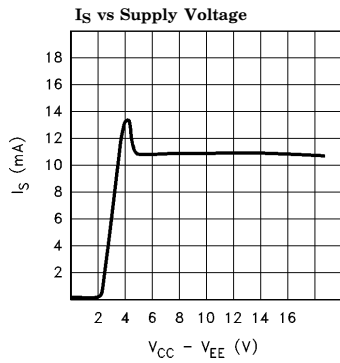
Pin Description

Pin Number	Pin Name	Function
1	V_{FB}	Feedback input
2	V_{IN}	Non-inverting input
3	V_{INB}	Inverting input
4	V_{REF}	Sets output voltage level to V_{REF} when $V_{IN} = V_{INB}$
5	NC	
6	V_{CC}	Positive supply voltage
7	V_{EE}	Negative supply voltage
8	V_{OUT}	Output voltage

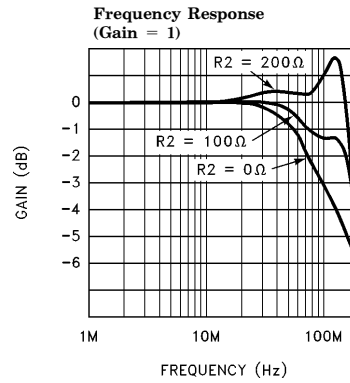
EL2142C

Differential Line Receiver

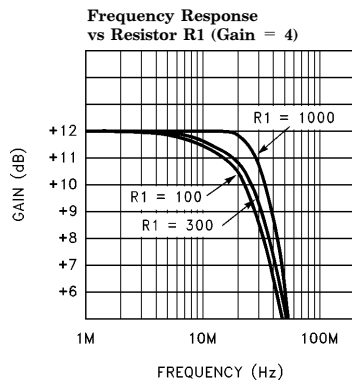
Typical Performance Curves



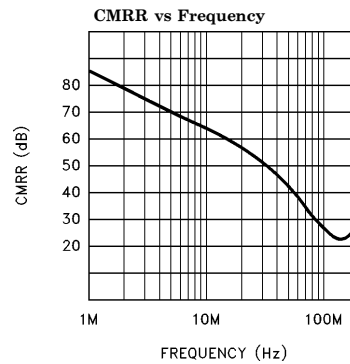
2142-2



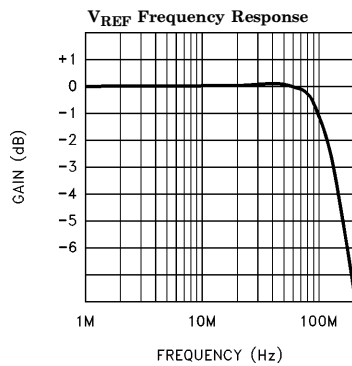
2142-3



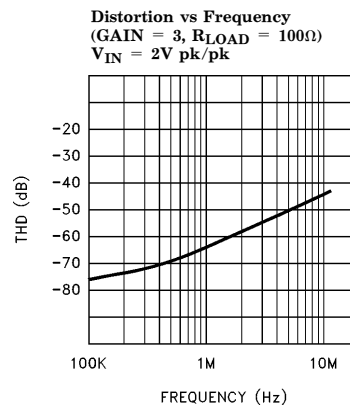
2142-4



2142-5



2142-6

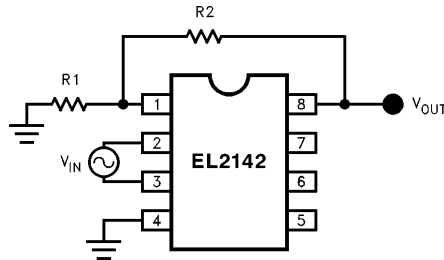


2142-7

EL2142C

Differential Line Receiver

Applications Information



2142-B

Gain Equation

$$V_{OUT} = ((R2+R1)/R1) \times (V_{IN}-V_{INB} + V_{REF}) \text{ when } R1 \text{ tied to GND}$$
$$V_{OUT} = ((R2+R1)/R1) \times (V_{IN}-V_{INB}) \text{ when } R1 \text{ tied to } V_{REF}$$

Choice of Feedback Resistor

For a gain of one, V_{OUT} may be shorted back to V_{FB} , but 100Ω – 200Ω improves the bandwidth. For gains greater than one, there is little to be gained from choosing resistor $R1$ value below 200Ω , for it would only result in increased power dissipation and potential signal distortion. Above 200Ω , the bandwidth response will develop some peaking (for a gain of one), but substantially higher $R1$ values may be used for higher voltage gains, such as up to $1\text{ k}\Omega$ at a gain of four before peaking will develop.

Capacitance Considerations

As with many high bandwidth amplifiers, the EL2142C prefers not to drive highly capacitive loads. It is best if the capacitance on V_{OUT} is kept below 10 pF if the user does not want gain peaking to develop. The V_{FB} node forms a potential pole in the feedback loop, so capacitance should be minimized on this node for maximum bandwidth.

The amount of capacitance tolerated on any of these nodes in an actual application will also be dependent on the gain setting and the resistor values in the feedback network.

EL2142C

Differential Line Receiver

Typical Applications

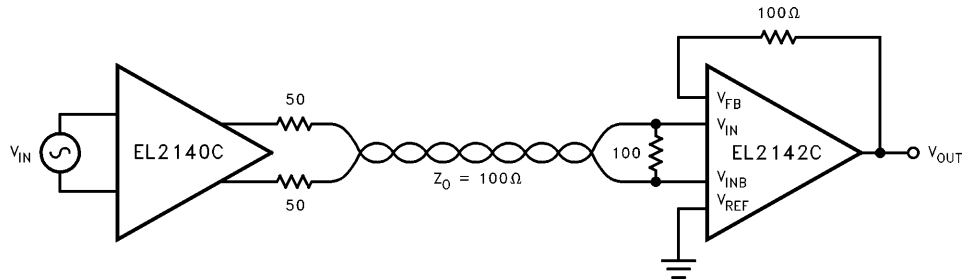


Figure 1. Typical Twisted Pair Application

2142-9

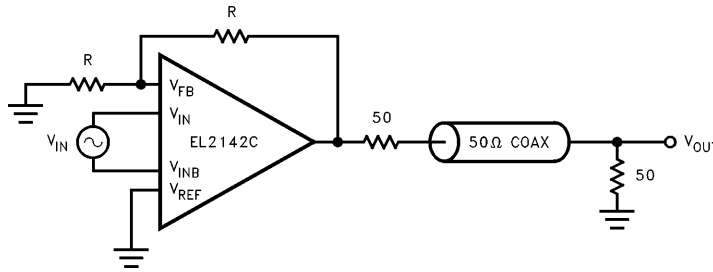


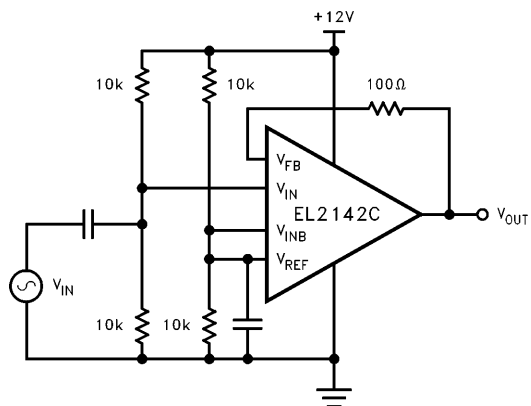
Figure 2. Coaxial Cable Driver

2142-10

EL2142C

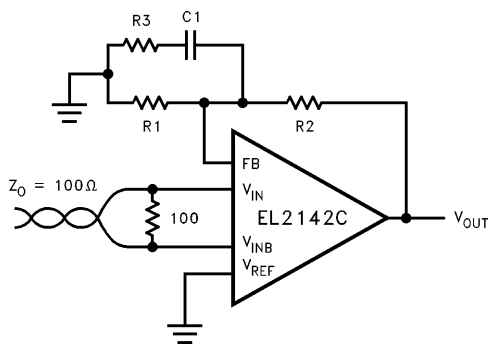
Differential Line Receiver

Typical Applications — Contd.

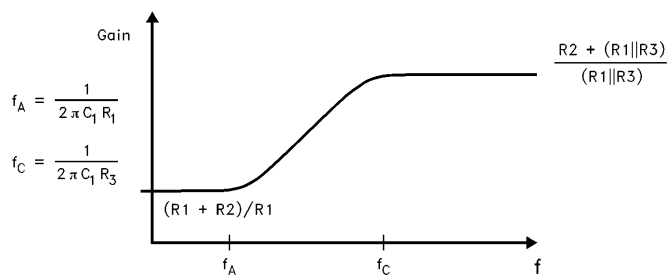


2142-11

Figure 3. Single Supply Receiver



2142-12



2142-13

Figure 4. Compensated Line Receiver

EL2142C

Differential Line Receiver

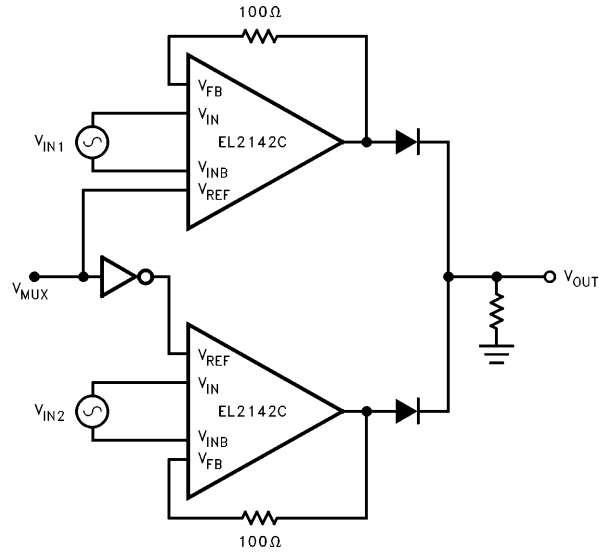


Figure 5. Two Channel Multiplexer

2142-14

General Disclaimer

Specifications contained in this data sheet are in effect as of the publication date shown. Elantec, Inc. reserves the right to make changes in the circuitry or specifications contained herein at any time without notice. Elantec, Inc. assumes no responsibility for the use of any circuits described herein and makes no representations that they are free from patent infringement.

élantec
HIGH PERFORMANCE ANALOG INTEGRATED CIRCUITS

Elantec, Inc.
1996 Tarob Court
Milpitas, CA 95035
Telephone: (408) 945-1323
(800) 333-6314
Fax: (408) 945-9305
European Office: 44-71-482-4596

WARNING — Life Support Policy

Elantec, Inc. products are not authorized for and should not be used within Life Support Systems without the specific written consent of Elantec, Inc. Life Support systems are equipment intended to support or sustain life and whose failure to perform when properly used in accordance with instructions provided can be reasonably expected to result in significant personal injury or death. Users contemplating application of Elantec, Inc. products in Life Support Systems are requested to contact Elantec, Inc. factory headquarters to establish suitable terms & conditions for these applications. Elantec, Inc.'s warranty is limited to replacement of defective components and does not cover injury to persons or property or other consequential damages.