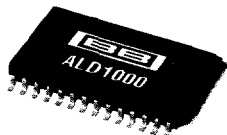


For Immediate Assistance, Contact Your Local Salesperson



ALD1000

www.burr-brown.com/databook/ALD1000.html

Precision Programmable CURRENT/VOLTAGE TRANSMITTER

FEATURES

- SWITCHABLE OUTPUT $\pm 10V$ OR 4-20mA
- DRIVES 1000Ω || $1\mu F$ AT 20mA
- VOLTAGE AND CURRENT SENSE
- GROUND NOISE SUPPRESSION
- ERROR DETECTION FLAG
- OUTPUT DISABLE
- ACCURACY: 0.05% max
- WIDE SUPPLY RANGE: $\pm 11V$ TO $+24/-15V$

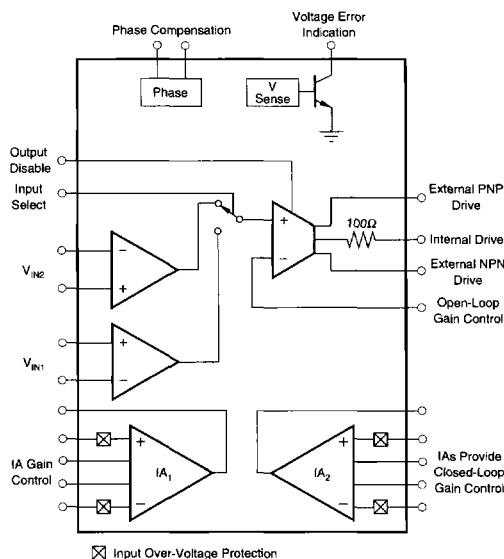
APPLICATIONS

- PROGRAMMABLE CONTROLLERS
- STANDARDIZED OUTPUTS FOR TERMINATION PANELS
- INDUSTRIAL PROCESS CONTROL
- PROGRAMMABLE CURRENT SOURCE
- MOTOR CONTROL SYSTEMS
- PC AND VME BASED INSTRUMENTATION
- CONDITIONER FOR STANDARD SENSOR OUTPUTS
- TEST EQUIPMENT PIN DRIVER

DESCRIPTION

This product is a monolithic programmable voltage-to-current or voltage-to-voltage analog line driver circuit. It can convert a $\pm 10V$ input into either an output voltage or current with remote sensing. It provides drive for external transistors to boost output current to greater than $\pm 25mA$ levels.

Current and voltage sensing can be performed simultaneously. Current sensing is achieved through a single external sense resistor. Voltage sensing is performed directly across the load. The logic inputs provide for both output disable and switching between constant current or constant voltage output functions. An open collector output provides an error flag for open circuit loads. The output disable function allows full control of the output even during power-on and power-off sequencing. The instrumentation amplifiers are designed to insure that load noise is not circulated within the control loop.



Or, Call Customer Service at 1-800-548-6132 (USA Only)

SPECIFICATIONS

At $+V_S = 24V$, $-V_S = 15V$, $T_{AMB} = 25^\circ C$, and 2N2222, 2N2907 external transistors, unless otherwise noted.

| PARAMETER | CONDITIONS | ALD1000U | | | UNITS | | | | |
|--|---|----------|------------|-----|---|----|----|----|---|
| | | MIN | TYP | MAX | | | | | |
| TRANSMITTER | | | | | | | | | |
| SWOP INPUTS | | | | | | | | | |
| Linear Range Min | Internal Drive Transistors 5mA Load | 10 | 50 | -10 | V | | | | |
| Linear Range Max | | | | | V | | | | |
| Input Bias Current | | | | | µA | | | | |
| XTR OUTPUT | | | | | | | | | |
| Positive Overvoltage Sense | Internal Drive Transistors | | 19.5 | | V | | | | |
| Negative Overvoltage Sense | | | | | V | | | | |
| Positive Overcurrent Sense | | | | | +25 | mA | | | |
| Negative Overcurrent Sense | | | | | -15 | mA | | | |
| LOGIC INPUTS | | | | | | | | | |
| Logic Low | | 4.0 | 2.6 | 0.8 | V | | | | |
| Logic High | | | | | V | | | | |
| LOGIC OUTPUTS | | | | | | | | | |
| Logic High | 5V Logic Supply with 10k pull-up resistor | 4.0 | | 0.8 | V | | | | |
| Logic Low | | | | | V | | | | |
| OUTPUT—VOLTAGE MODE (Gain = 1 unless otherwise specified) | | | | | | | | | |
| Span Error | 0.1% of FS 0.1% of FS Internal Drive Transistors Internal Drive Transistors Internal Drive Transistors Internal Drive Transistors Internal Drive Transistors Initial Offset Voltage—RTI Offset Voltage vs Temperature | 10 | 5 | 1 | % | | | | |
| Span Drift | | | | | ppm/°C of FS | | | | |
| Linear Range Min | | | | | mA | | | | |
| Linear Range Max | | | | | mA | | | | |
| Output Current Min | | | | | mA | | | | |
| Output Current Max | | | | | mA | | | | |
| Short-Circuit Current | | | | | mA | | | | |
| Short-Circuit Current | | | | | mA | | | | |
| Non-Linearity | | | | | % | | | | |
| Initial Offset Voltage—RTI | | | | | mV | | | | |
| Offset Voltage vs Temperature | | | | | µV/°C | | | | |
| OUTPUT—CURRENT MODE (Gain = 5 with 50Ω shunt resistor unless otherwise specified) | | | | | | | | | |
| Span Error | | | | | Gain = 1 ⁽¹⁾ Internal Drive Transistors ⁽²⁾ Internal Drive Transistors ⁽²⁾ | 5 | 50 | -5 | % |
| Span Drift | ppm/°C of FS | | | | | | | | |
| Output Current Min | mA | | | | | | | | |
| Output Current Max | mA | | | | | | | | |
| Compliance Min | V | | | | | | | | |
| Compliance Max | V | | | | | | | | |
| Offset Current Min | µA | | | | | | | | |
| Offset Current Min | µA | | | | | | | | |
| INSTRUMENTATION AMPLIFIERS $R_{LOAD} = 10k$ | | | | | | | | | |
| IA INPUTS | | | | | | | | | |
| Linear Input Voltage Min | $V_{IN} = 0$ $V_{IN} = 0$ | 20 | 100 | -10 | V | | | | |
| Linear Input Voltage Max | | | | | V | | | | |
| Common-Mode Input Voltage Min | | | | | V | | | | |
| Common-Mode Input Voltage Max | | | | | V | | | | |
| Input Bias Current | | | | | nA | | | | |
| Initial Offset Voltage | | | | | mV | | | | |
| CMRR | $G = 1$ $G = 10$ | -1 80 | 100 100 | 1 | | | | | |
| IA OUTPUTS (with 10k Load) | | | | | | | | | |
| Output Voltage Max | | 20 | | -10 | V | | | | |
| Output Voltage Min | | | | | V | | | | |
| + Short Circuit Current | | | | | mA | | | | |
| - Short Circuit Current | | | | | mA | | | | |
| GAIN EQUATION (gain = $1+50k/R_O$) | | | | | | | | | |
| Gain Error, $G = 1$ | | | | | 0.3 | | | | |
| Gain Error, $G = 5$ | | | | | 0.6 | | | | |
| Gain Error, $G = 100$ | | | | | 0.8 | | | | |
| Non-Linearity, $G = 1$ | | | | | 0.004 | | | | |
| Non-Linearity, $G = 5$ | | | | | 0.008 | | | | |
| Non-Linearity, $G = 100$ | | | | | 0.02 | | | | |

ALD1000

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INSTRUMENTATION AMPLIFIERS

For Immediate Assistance, Contact Your Local Salesperson

SPECIFICATIONS (CONT)

At $+V_S = 24V$, $-V_S = 15V$, $T_{AMB} = 25^\circ C$, and 2N2222, 2N2907 external transistors, unless otherwise noted.

| PARAMETER | CONDITIONS | ALD1000U | | | UNITS | |
|---|--------------------------|----------------------------|-----------------------|-----|---------------------------------|--------------------------|
| | | MIN | TYP | MAX | | |
| FREQUENCY RESPONSE G = 1 G = 5 G = 100 Slew Rate | $V_O = \pm 10V$, G = 10 | | 700 400 50 4 | | kHz kHz kHz V/ μ S | |
| SETTLING TIME, 0.01% G = 1 G = 5 G = 100 | | | 20 20 30 | | μ S μ S μ S | |
| POWER SUPPLY Quiescent Current | | Internal Drive Transistors | | 5 | | mA |
| TEMPERATURE RANGE Operating Storage | | | -40 -65 | | +85 +150 | $^\circ C$ $^\circ C$ |

NOTES: (1) Gain drift depends on tempco of 50K factor on gain equation when gain is greater than 1. (2) External Drive capacity varies with configuration. See Application Note.

ABSOLUTE MAXIMUM RATINGS

| | |
|---|-----------------------------------|
| Supply Voltage ($\pm V_S$) | +25V, -18V |
| IA Inputs | $\pm 40V$ |
| SWOP Inputs | $\pm V_S$ |
| Logic Inputs | $+V_S, -V_S + 0.5V$ |
| Junction Temperature | 150 $^\circ C$ |
| Storage Temperature | -65 $^\circ C$ to +150 $^\circ C$ |
| Lead Temperature (soldering, 10s) | +300 $^\circ C$ |
| Output Short-to-Ground at 25 $^\circ C$ | Continuous |

PACKAGE/ORDERING INFORMATION

| PRODUCT | PACKAGE | PACKAGE DRAWING NUMBER ⁽¹⁾ |
|----------|-------------|---------------------------------------|
| ALD1000U | 28-Pin SOIC | 217 |

NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book.

ELECTROSTATIC DISCHARGE SENSITIVITY

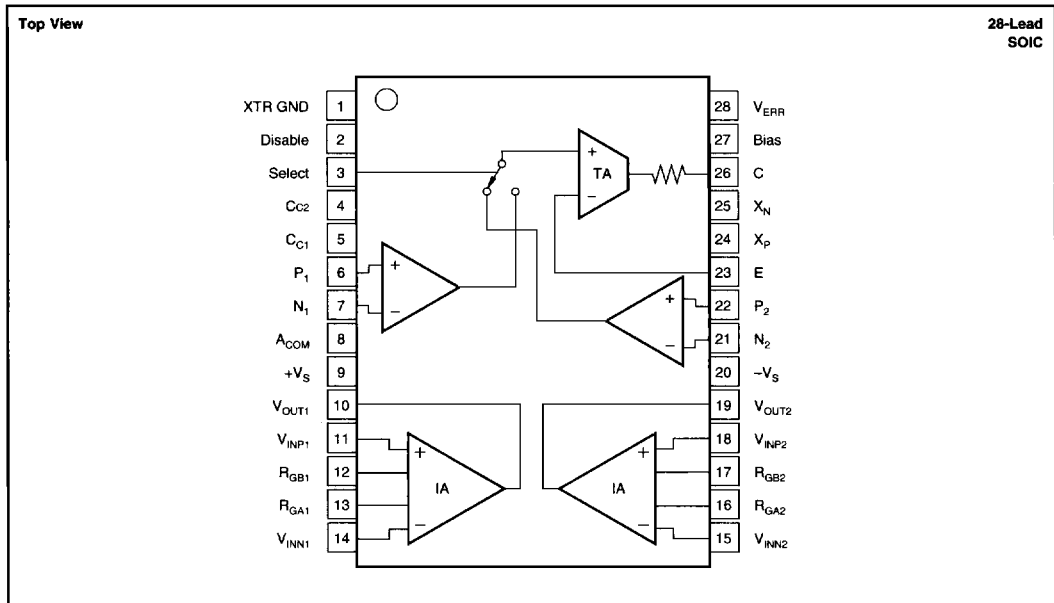
This integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

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PIN CONFIGURATION



ALD1000

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INSTRUMENTATION AMPLIFIERS

PIN ASSIGNMENTS

| PIN # | NAME | DESCRIPTION |
|-------|---------|---|
| 1 | XTR GND | Power ground pin. |
| 2 | Disable | A 5V signal puts the internal drive in a high impedance state and limits the external drive capacity. |
| 3 | Select | Selects the SWOP amp input. A 5V signal selects inputs N1 and P1. |
| 4 | Cc2 | Cc1 and Cc2 are for the external compensation capacitor. |
| 5 | Cc1 | Cc1 and Cc2 are for the external compensation capacitor. |
| 6 | P1 | Non-inverting input to the XTR SWOP amp 1. |
| 7 | N1 | Inverting input to the XTR SWOP amp 1. |
| 8 | ACOM | Signal ground for the instrumentation amplifiers. |
| 9 | +Vs | Positive power supply voltage. |
| 10 | VOUT1 | Output of the instrumentation amplifier 1. |
| 11 | VINP1 | Non-inverting input to instrumentation amplifier 1. |
| 12 | RGB1 | Gain set resistor for instrumentation amplifier 1. |
| 13 | RGA1 | Gain set resistor for instrumentation amplifier 1. |
| 14 | VINN1 | Inverting input of instrumentation amplifier 1. |
| 15 | VINN2 | Inverting input of instrumentation amplifier 2. |
| 16 | RGA2 | Gain set resistor for instrumentation amplifier 2. |
| 17 | RGB2 | Gain set resistor for instrumentation amplifier 2. |
| 18 | VINP2 | Non-inverting input to instrumentation amplifier 2. |
| 19 | VOUT2 | Output of the instrumentation amplifier 2. |
| 20 | -Vs | Negative power supply voltage. |
| 21 | N2 | Inverting input to the XTR SWOP amp 2. |
| 22 | P2 | Non-inverting input to the XTR SWOP amp 2. |
| 23 | E | Inverting input (emitter) of the output transconductance amplifier. |
| 24 | Xp | Base drive for an external, PNP, driver transistor (optional). |
| 25 | Xn | Base drive for an external, NPN, driver transistor (optional). |
| 26 | C | Output (collector) of the output transconductance amplifier. |
| 27 | Bias | Open collector output indicating an internal overcurrent condition. |
| 28 | VERR | Open collector output indicating an overvoltage condition. |