LIA100

Linear Isolation Amplifier

Features

- Small Size Standard 16 Pin SOIC or DIP Package
- 0.01% Servo Linearity
- 5300 VAC Peak Input/Output Isolation Available
- Bandwidth ≥40kHz
- Machine Insertable, Wave Solderable
- Wide Power Supply Range ±18V
- Low Supply Current

Applications

- Isolated 4-20mA Converter
- Medical Sensor Isolation
- Switching Power Supply Feedback Circuits
- Isolated Temperature/Pressure Sensors
- Data Acquisition Equipment
- Isolated Motor Controls

Description

The LIA100 and LIA101 are linear isolation amplifiers that integrate a linear optocoupler with two op amps in a single package. They are available in a 16 Pin SOIC or DIP package.

Approvals

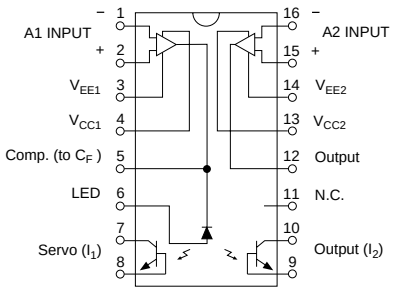
- UL Recognized: File Number E76270
- CSA Certified: File Number LR 43639-10
- BSI Certified to:
  - BS EN 60950:1992 (BS7002:1992) Certificate #: 7344
  - BS EN 41003:1993 Certificate #: 7344

Ordering Information

Part #	Description
LIA100	16 Pin DIP (50/Tube)
LIA100P	16 Pin Flatpack (50/Tube)
LIA100PTR	16 Pin Flatpack (1000/Reel)

Pin Configuration

LIA100/LIA101 Pinout



Absolute Maximum Ratings (@ 25° C)

Parameter	Min	Typ	Max	Units
Supply Voltages	± 5	-	±18	V
Differential Input Voltage	-	-	± 30	V
Output Short Circuit Duration		Continuous		-
Total Package Dissipation	-	-	11	W
Isolation Voltage Input to Output	3750	-	-	V_{RMS}
Operational Temperature	-40	-	+85	°C
Storage Temperature	-40	-	+125	°C
Soldering Temperature DIP Package	-	-	+260	°C
Surface Mount Package (10 Seconds Max.)	-	-	+220	°C

[1] Above 25°C Derate Linearly 1.67mW/°C

Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this data sheet is not implied. Exposure of the device to the absolute maximum ratings for an extended period may degrade the device and effect its reliability.

Electrical Characteristics @ TA = +25°C and ±VCC = 15VDC (unless otherwise specified)

PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNITS
Isolation					
Continuous Voltage, AC	-	-	-	3750	V_{RMS}
Input to Output Leakage Current	$1000V_{RMS}$, 60Hz	-	0.2	-	μA_{RMS}
Offset Voltage					
Output Offset Voltage (VOS)	RF=RIN=51KΩ, K3=1.000	-	50	-	mV
Input Grounded TA=25°C					
Amplifier Input Impedance	-	-	10^{12} || 3	-	Ω || pF
ΔVOS/ΔT Average TC of Input Offset Voltage	RS=50Ω	-	5	-	µV/°C
(Input and Output Stage)					
Common Mode Rejection Ratio, CMRR	60Hz, RF=1MΩ	-	100	-	dB
RIN=10KΩ, Gain=100					
Input Offset Voltage	RS=50Ω, TA=25°C	-	3	10	mV
Common Mode Range		±12	-	-	V
Frequency Response					
Bandwidth	-	-	40	-	kHz
Slew Rate	0-10V Step Input	-	0.3	-	V/µs
Non-Linearity	F_O=300Hz, -10dBm	-	-	0.01	%
Power Supplies					
Input Stage Supply Voltage VCC1, VEE1	-	±5	-	±18	V
Output Stage Supply Voltage VCC2, VEE2	-	±5	-	±18	V
Input (A1) & Output Stage (A2) Supply Current	-	-	5	10	mA
Power Supply Rejection Ratio, PSRR	-	-	80	100	dB

Electrical Characteristics @ TA = +25°C and ±VCC = 15VDC (unless otherwise specified) (Continued)

PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNITS
LED Parameters					
Forward LED Current (IF)	-	-	-	20	mA
LED Forward Voltage Drop (VF)	I_F=10mA	0.9	1.2	1.4	V
Reverse LED Current	V_R=5V	-	-	10	µA
Reverse LED Voltage	-	-	-	5	V
Coupled Characteristics					
K1, Servo Gain (I1/IF)	I_F=2-10mA, V_{CC}=15V	0.004	0.008	0.030	
K2, Forward Gain (I2/IF)	I_F=2-10mA, V_{CC}=15V	0.004	0.008	0.030	
K3, Transfer Gain (K2/K1)	I_F=2-10mA, V_{CC}=15V	0.550	1.000	1.420	
K3, Temperature Coefficient	Over Temperature Range	-	0.005	-	%/°C
Temperature Range					
Operating	-	-40	-	+85	°C
Storage	-	-40	-	+125	°C

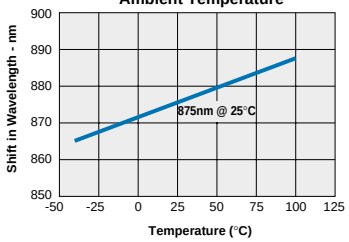
K3 Sorted Bins

Bin A = 0.550-0.605
Bin B = 0.606-0.667
Bin C = 0.668-0.732
Bin D = 0.733-0.805
Bin E = 0.806-0.886
Bin F = 0.887-0.974
Bin G = 0.975-1.072
Bin H = 1.073-1.179
Bin I = 1.180-1.297
Bin J = 1.298-1.426

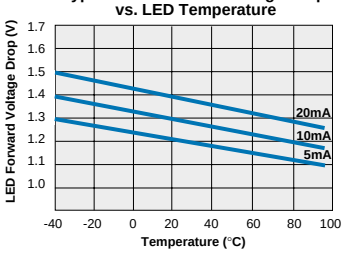
- The LIA101 Series (through hole) is shipped in anti-static tubes of 25 pieces. The LIA100P Series (flatpack) is shipped in anti-static tubes of 50 pieces. Each tube will contain one K3 sorted bin.
- Bin designation marked on each device (A-J).
- Orders for the LIA100/LIA100P product will be shipped using bins available at the date of the order. Any bin (A-J) can be shipped.
- For customers requiring selected bins D E F G we offer part numbers LIA101/LIA101P.

PERFORMANCE DATA*

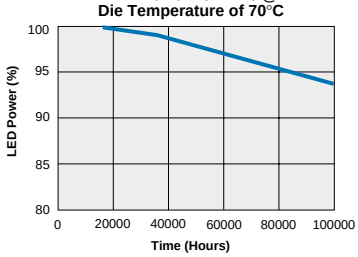
LIA100/LIA101
LED Peak Wavelength vs. Ambient Temperature



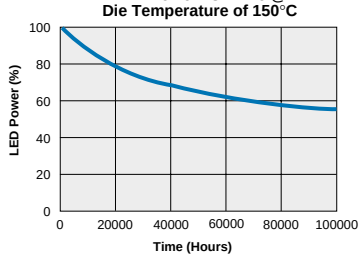
LIA100/LIA101
Typical LED Forward Voltage Drop vs. LED Temperature



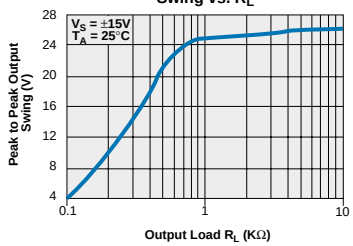
LIA100/LIA101
LED Power vs. Time @ Die Temperature of 70°C



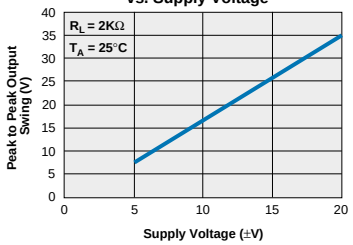
LIA100/LIA101
LED Power vs. Time @ Die Temperature of 150°C



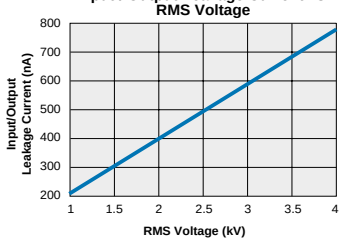
LIA100/LIA101
Op-Amp Output Voltage Swing vs. R_L



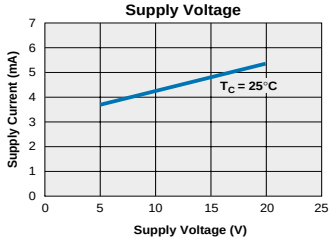
LIA100/LIA101
Op-amp Output Voltage Swing vs. Supply Voltage



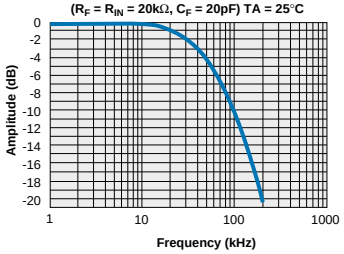
LIA100/LIA101
Input / Output Leakage Current vs. RMS Voltage



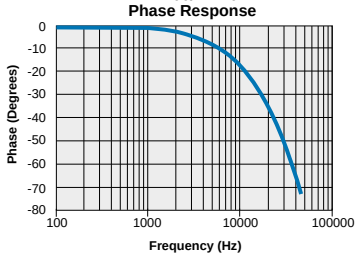
LIA100/LIA101
Individual Op-Amp Supply Current vs. Supply Voltage



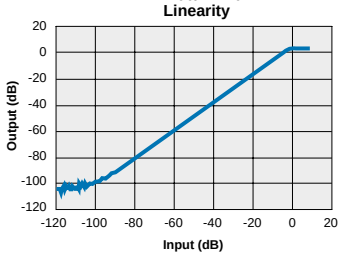
LIA100/LIA101
Frequency Response
($R_F = R_{IN}$ = 20kΩ, C_F = 20pF) TA = 25°C



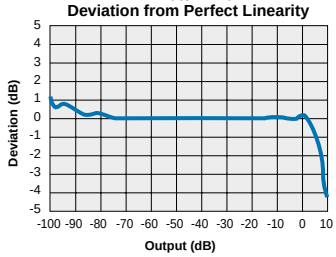
LIA100/LIA101
Phase Response



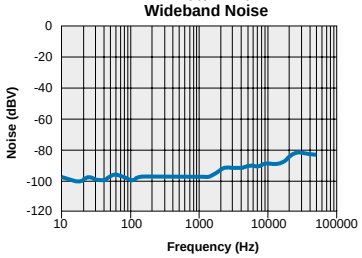
LIA100/LIA101
Linearity



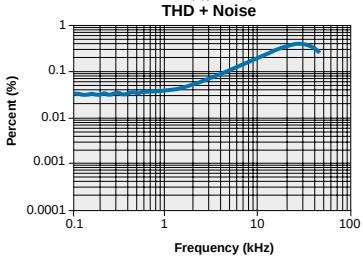
LIA100/LIA101
Deviation from Perfect Linearity



LIA100/LIA101
Wideband Noise



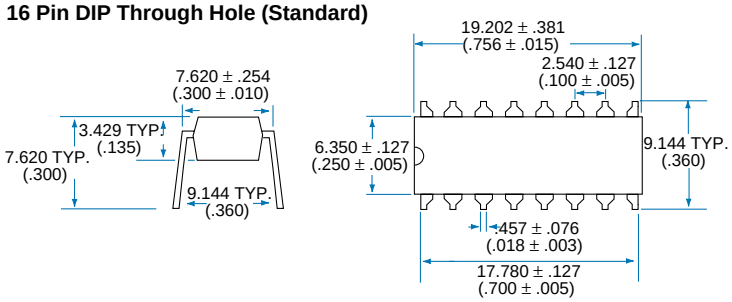
LIA100/LIA101
THD + Noise



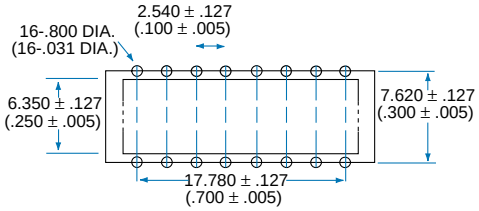
The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

Mechanical Dimensions

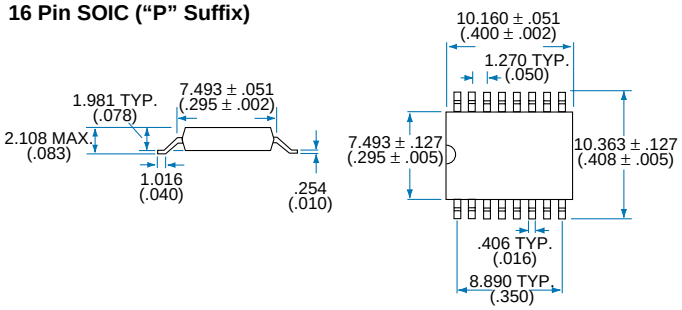
16 Pin DIP Through Hole (Standard)



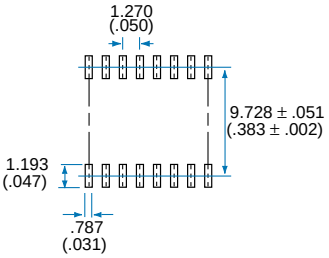
PC Board Pattern (Top View)



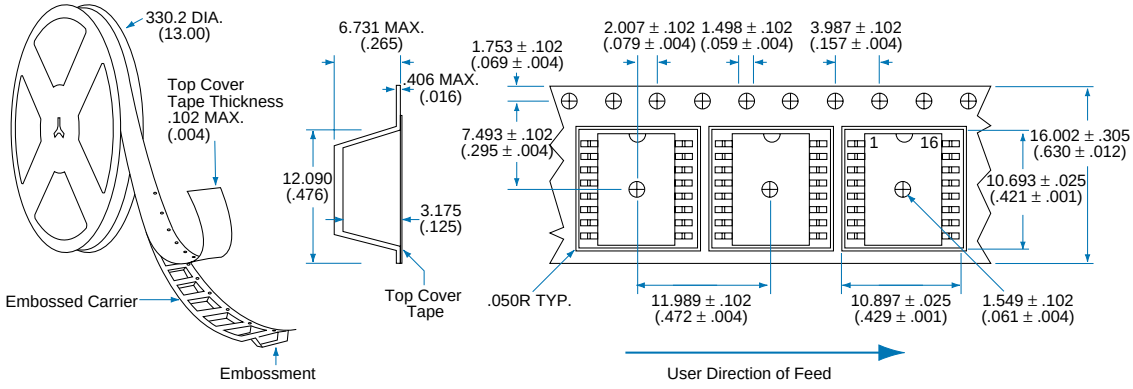
16 Pin SOIC (“P” Suffix)



PC Board Pattern (Top View)



Tape and Reel Packaging for 16 Pin SOIC Package



Dimensions
mm
(inches)

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Specification: DS-LIA100-R4

2/13/01