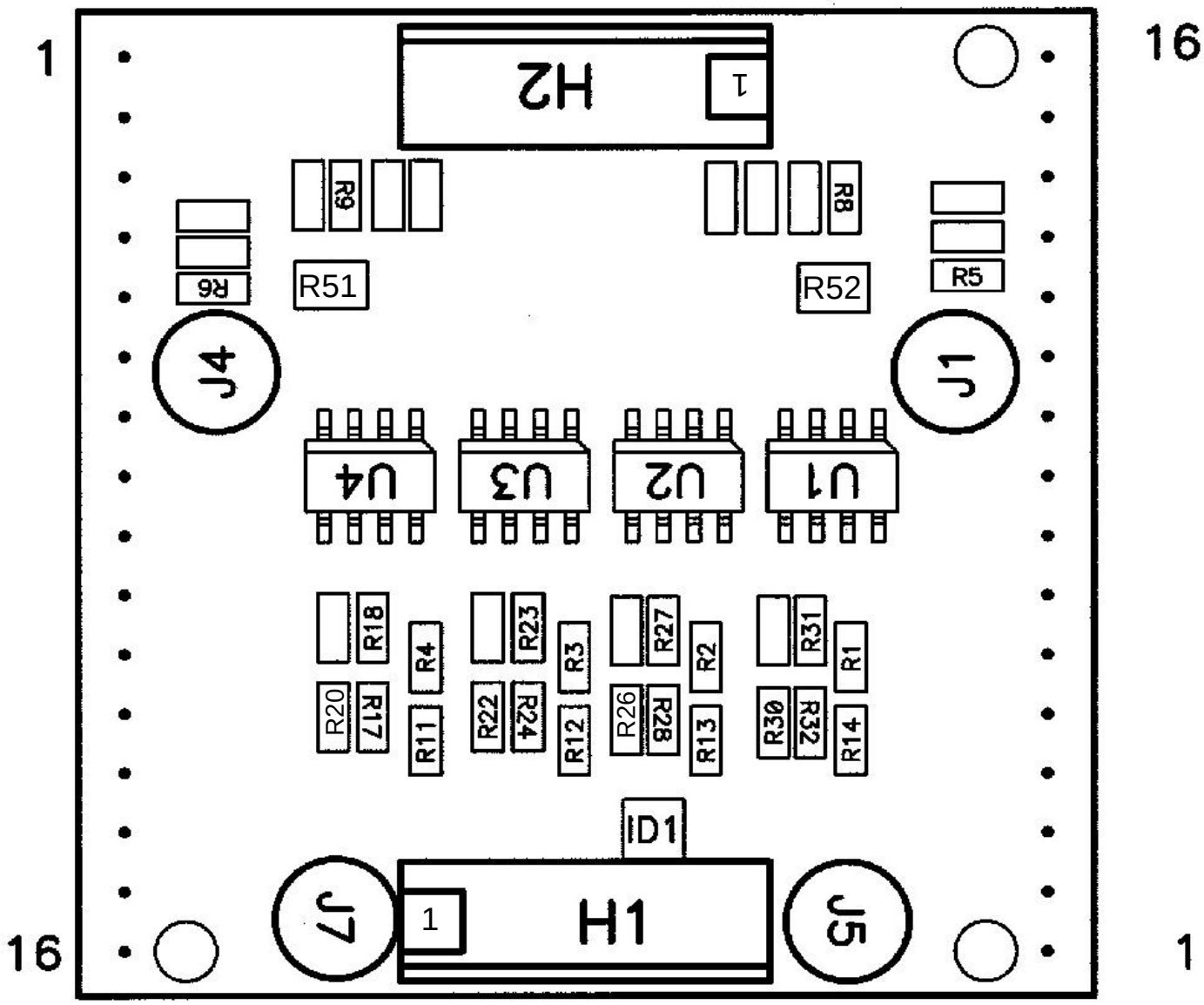
**RiK0015A**
**Differential I/O Buffer Module**

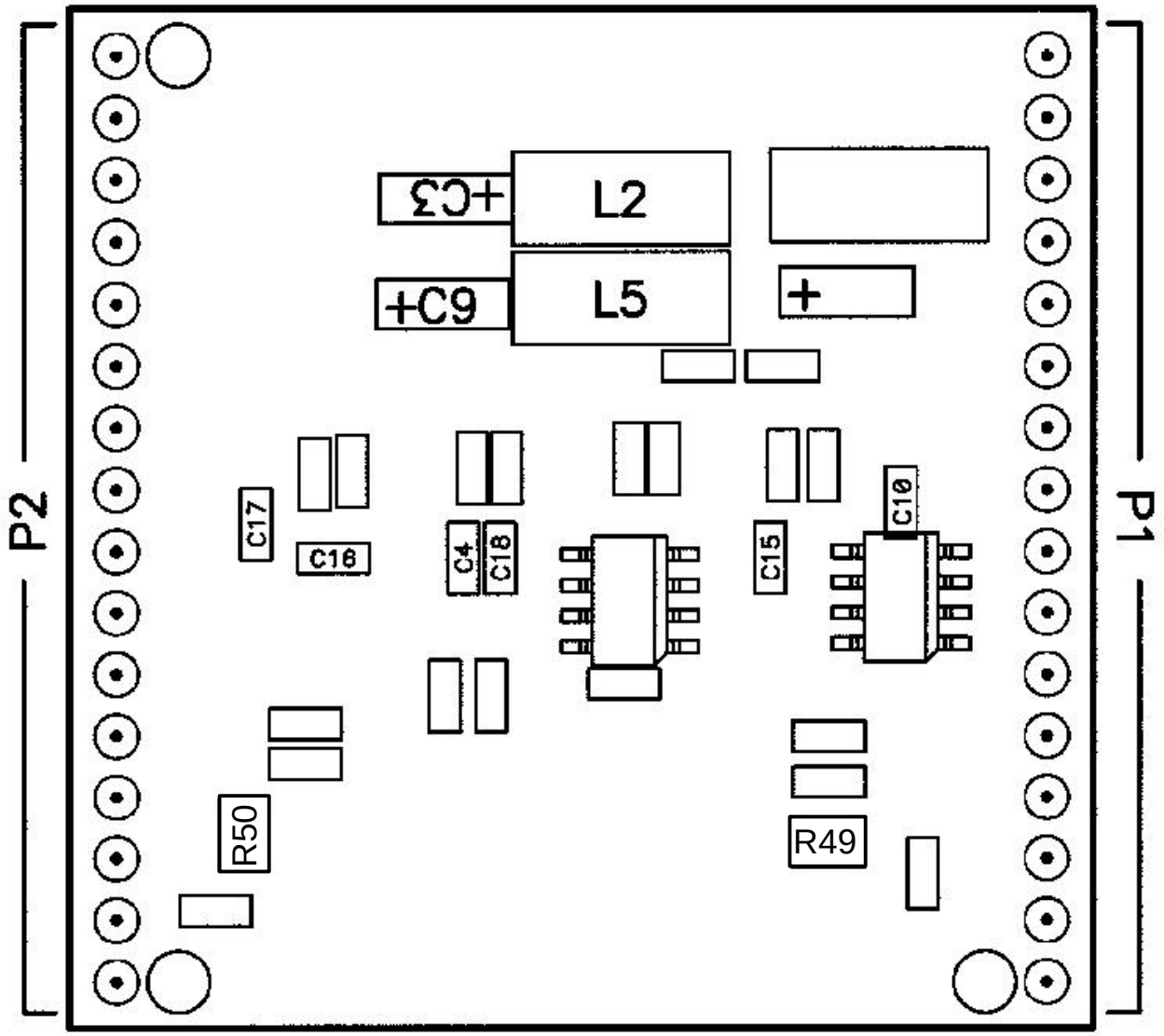
The RiK0015A Differential I/O Buffer Module is a configurable, multi-purpose circuit for the manipulation of video frequency signals. It can be configured to buffer between any combination of single-ended or differential I/O, voltage or current drive, at a user specified gain.

The various circuit configurations are established by the addition or removal of specified circuit resistors. The gain of the circuit is chosen by the selection of appropriate resistor values. See the specific configuration documentation for gain resistor formulations. The default circuit is configured for single ended voltage input to differential current output with a gain of 1/2000 (i.e. 1V in = 0.5 mA out).

The circuit is designed to operate in the RiK fixture. It is attached to the carrier board, which is mounted to the fixture top plate. All required voltages are provided in the RiK fixture. The coaxial connectors are MCX female.




RiK0015A
Differential I/O Buffer
Top Side
Roos Instruments, Santa Clara, CA




RiK0015A
Differential I/O Buffer
Bottom Side
Roos Instruments, Santa Clara, CA

## RiK0015A
## Single-ended Voltage to Differential Current Converter

**Input**: Voltage, Single-ended

| | Coax |
|---|---|
| In-phase Voltage Input (I) | J4 |
| Quadrature Voltage Input (Q) | J1 |

**Output**: Current, Differential

| | Header Pin |
|---|---|
| In-phase, Positive Output ($I_{pos}$): | H1-1 |
| In-phase, Negative Output ($I_{neg}$): | H1-2 |
| Quadrature, Positive Output ($Q_{pos}$): | H1-6 |
| Quadrature, Negative Output ($Q_{neg}$): | H1-5 |

| | |
|---|---|
| $I_{pos}$, V to I Conversion | $V_{in}$ / $R_3$ |
| $I_{neg}$, V to I Conversion | $V_{in}$ / $R_4$ |
| $Q_{pos}$, V to I Conversion | $V_{in}$ / $R_1$ |
| $Q_{neg}$, V to I Conversion | $V_{in}$ / $R_2$ |

| Component Identifier | Value | Size |
|---|---|---|
| $R_1$, $R_2$, $R_3$, $R_4$ | 2,000 Ohm | 0603 |
| (Default Condition: divide by 2000) | | |

**Changes Required to Convert Module**

Add the following Components:

| Component Identifier | Value | Size |
|---|---|---|
| $R_{11}$ | 0 Ohm | 0603 |

## RiK0015A
## Differential Voltage to Single-ended Voltage Converter

**Input**: Voltage, Differential

| | Header Pin |
|---|---|
| In-phase, Positive Input ($I_{pos}$): | H2-6 |
| In-phase, Negative Input ($I_{neg}$): | H2-5 |
| Quadrature, Positive Input ($Q_{pos}$): | H2-1 |
| Quadrature, Negative Input ($Q_{neg}$): | H2-2 |

**Output**: Voltage, Single-ended

| | Coax |
|---|---|
| In-phase Voltage Output (I) | J7 |
| Quadrature Voltage Output (Q) | J5 |

| | |
|---|---|
| I Signal Path Attenuation in dB | 20 x Log ( $R_{24}$ / (($R_{24}$+$R_3$)x2) ) |
| Q Signal Path Attenuation in dB | 20 x Log ( $R_{32}$ / (($R_{32}$+$R_1$)x2) ) |

**Changes Required to Convert Module**

Change the following Components:
(For 30 dB attenuation)

| Component Identifier | Value | Size |
|---|---|---|
| $R_{20}$, $R_{22}$, $R_{26}$, $R_{30}$ | 0 Ohm | 0603 |
| $R_{24}$, $R_{32}$ | 10 Ohm | 0603 |
| $R_{12}$, $R_{14}$ | 51.1 Ohm | 0603 |
| $R_1$, $R_3$ | 150 Ohm | 0603 |

Remove the following Components:

| Component Identifier | |
|---|---|
| $R_8$, $R_9$, $R_{11}$, $R_{13}$, $R_{17}$, $R_{28}$ | Remove these Items |