# 2.5/3.3V Ultra-Precision 4:1 CML/LVPECL MUX with 1:2 Fanout and Internal Termination

## SY58028/29/30U Evaluation Board

## General Description

The SY58028/29/30U evaluation boards are designed for convenient setup and quick evaluation of the respective devices. The boards are optimized to interface directly to 50Ω systems.

The evaluation boards are configured for AC-coupled inputs and DC-coupled outputs. For applications that require AC-coupled outputs, step-by-step instructions for modifying the board are included.

Data sheets and support documentations can be found on Micrel's web site at www.micrel.com.

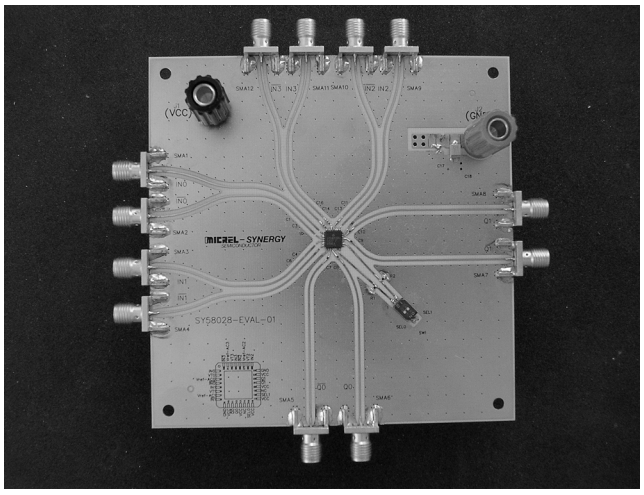
## Features

- SY58028U, SY58029U, SY58030U
- +2.5V or +3.3V power supply
- AC-coupled inputs and DC-coupled outputs
- Can be reconfigured for AC-coupled output operation

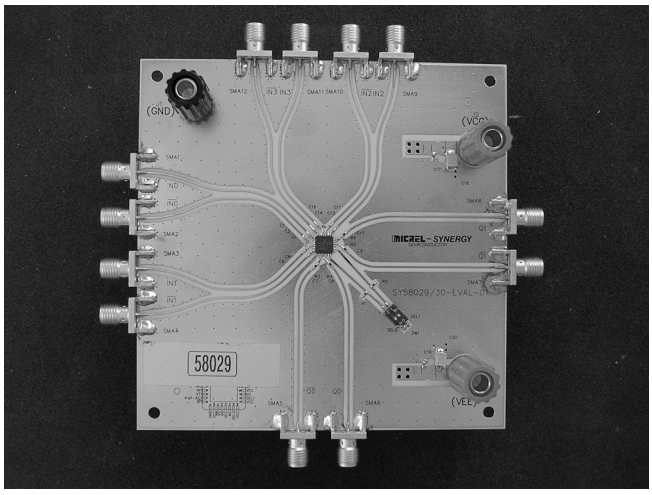
## Related Documentation

- SY58028U, 2.5/3.3V Ultra-Precision 4:1 CML MUX w/ 1:2 Fanout and Internal Termination Data Sheet
- SY58029U, 2.5/3.3V Ultra-Precision 4:1 LVPECL MUX w/ 1:2 Fanout and Internal Termination Data Sheet
- SY58030U, 2.5/3.3V Ultra-Precision 4:1 400mV LVPECL MUX w/ 1:2 Fanout and Internal Termination Data Sheet

## Evaluation Board



**SY58028U**




**SY58029/30U**


hbwhelp@micrel.com or (408) 955-1690

## Evaluation Board Description

The SY58028U is a CML evaluation board and the SY58029U and SY58030U are LVPECL and 400mV LVPECL evaluation board sharing the same design.

The default configuration for these boards is AC-coupled inputs and DC-coupled outputs. The evaluation boards can be reconfigured in AC-coupled output configuration.

### Input Interface

The evaluation board is shipped with input termination and the input common mode voltage is set at $V_{CC}$-1.3V, which can easily interface to any differential signal over the supply voltage without modifying the evaluation board.

### SY58028U AC-Coupled Outputs

The SY58028U outputs can be reconfigured for AC-coupled outputs by replacing C7–C10 with 0.1µF, 0402, capacitors. See the SY58028U evaluation board schematic for more details.

### SY58029/30U AC-Coupled Outputs

The SY58029/30U outputs can be reconfigured for AC-coupled outputs by replacing C7–C10 with 0.1µF, 0402, capacitors and by adding 82Ω pull-downs to R3–R6. See the SY58029/30U evaluation board schematic for more details.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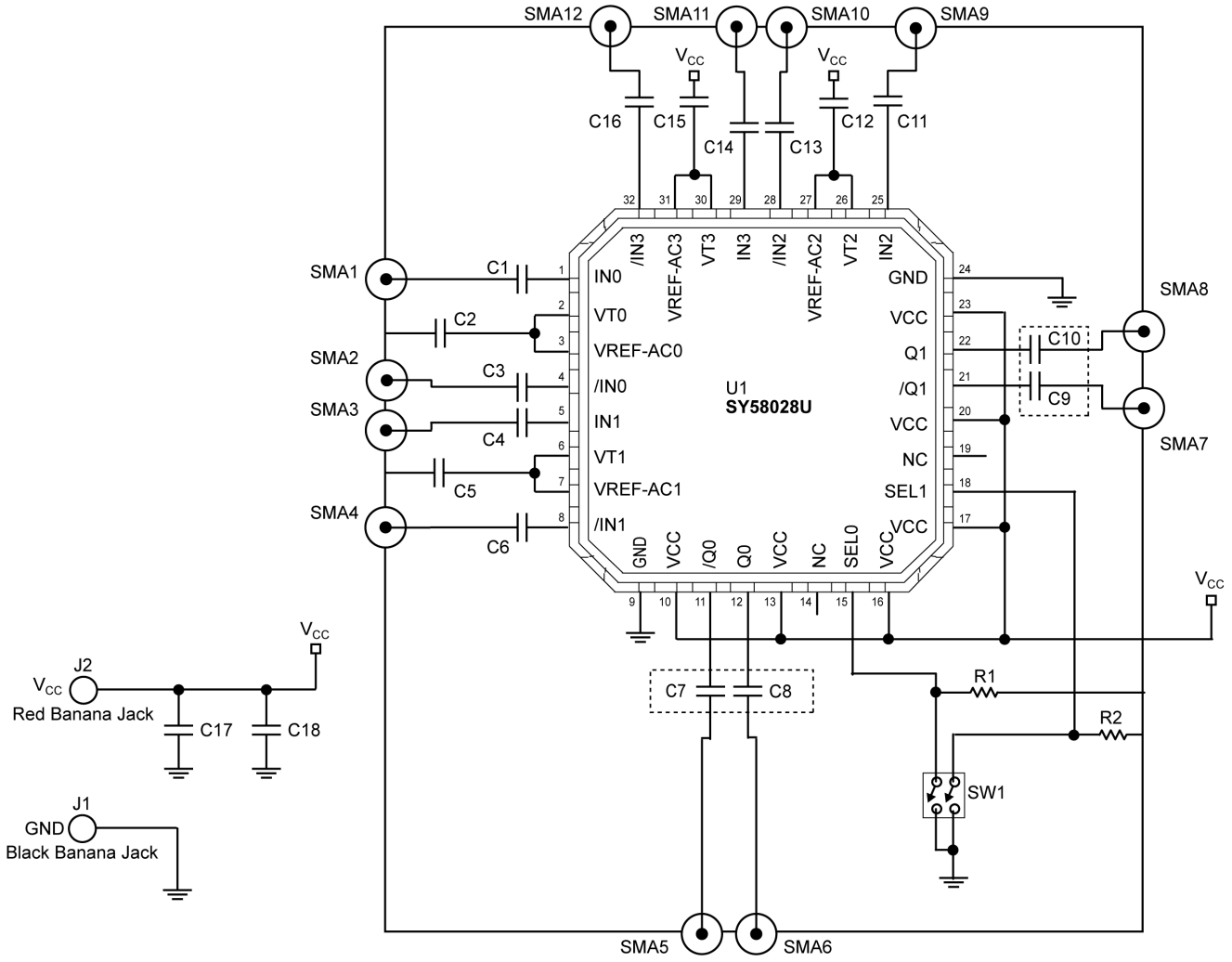
## Evaluation Board



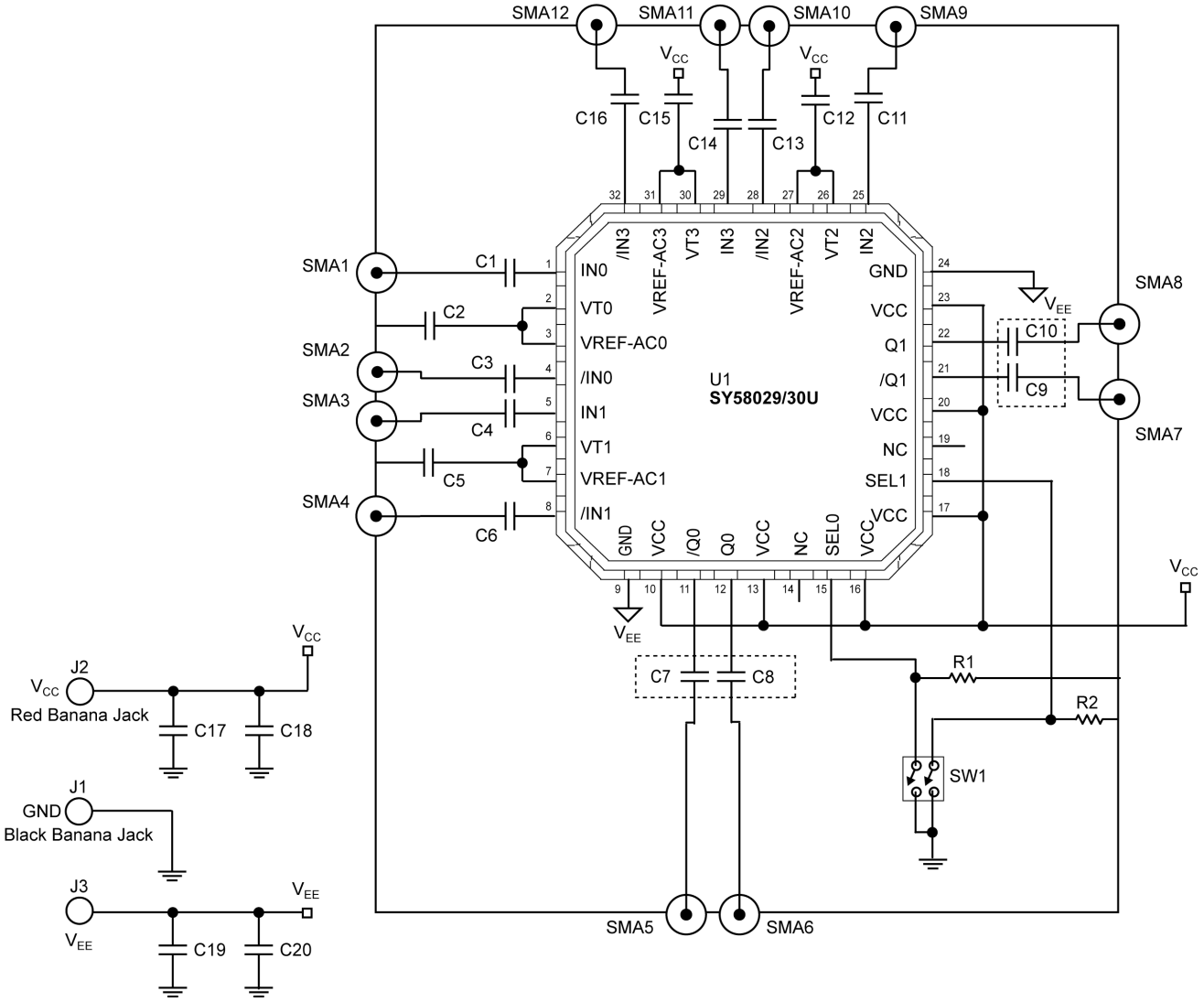

**SY58028U CML Evaluation Board**

| I/O | C7-C10 |
|---|---|
| AC-Coupled Input/DC-Coupled Output | 0Ω |
| AC-Coupled Input/AC-Coupled Output | 0.1uF |

**Table 1. SY58028U Configuration**

Note: The default configuration is AC-Coupled In/DC-Coupled Out.

## Evaluation Board




**SY58029/30U LVPECL Evaluation Board**

| I/O | Power Supply | $V_{CC}$ | GND | $V_{EE}$ | R3-R6 | C7-C10 |
|---|---|---|---|---|---|---|
| AC-coupled Input/DC-coupled Output | 2.5V | +2V | 0 | -0.5V | None | 0Ω |
| AC-coupled Input/DC-coupled Output | 3.3V | +2V | 0 | -1.3V | None | 0Ω |
| AC-Coupled Input/AC-Coupled Output | 2.5V | 2.5V | 0 | 0 | 50Ω | 0.1uF |
| AC-Coupled Input/AC-Coupled Output | 3.3V | 3.3V | 0 | 0 | 100Ω | 0.1uF |

**Table 2. SY58029/30U Configuration**

Note: The default configuration is AC-Coupled In/DC-Coupled Out.

## DC-Coupled Evaluation Board Setup

The following steps describe the procedure for setting up the evaluation board:

**SY58028U**

For 2.5V operation

- $V_{CC}$ = +2.5V
- $V_{EE}$ = 0V
- GND = 0V

For 3.3V operation

- $V_{CC}$ = +3.3V
- $V_{EE}$ = 0V
- GND = 0V

**SY58029/30U**

For 2.5V operation

- $V_{CC}$ = 2.0V
- $V_{EE}$ = -0.5V
- GND = 0V

For 3.3V operation

- $V_{CC}$ = 2.0V
- $V_{EE}$ = -1.3V
- GND = 0V

1. Signal Generator: Using a differential signal source, set the amplitude of each side of the differential pair to 400mV (800mV measured differentially). Set the offset to a positive value, the value of the offset is not critical, since the AC-coupled inputs will be automatically biased. Turn off or disable the outputs of the signal source.
2. I/O Cable Interface: Using equal length 50Ω impedance coaxial cables connect the signal source to the inputs on the evaluation board. Using equal length 50Ω impedance coaxial cables connect the outputs of the evaluation board to the oscilloscope or other measurement device that has an internal 50Ω termination. Unequal length cables are not recommended since they introduce duty cycle distortion and unwanted signal delays.
3. Connect the trigger input of the scope to the trigger output of the signal generator.
4. Program the channel selection using the evaluation boards dipswitch.

| SEL1 | SEL0 | Channel |
|---|---|---|
| 0 | 0 | IN0 |
| 0 | 1 | IN1 |
| 1 | 0 | IN2 |
| 1 | 1 | IN3 |

5. Enable the signal source and monitor the outputs.

## Evaluation Board Layout

| Layer | SY58028U | SY58039/30U |
|---|---|---|
| L1 | $V_{CC}$ and Signal | GND and Signal |
| L2 | $V_{CC}$ | GND |
| L3 | GND | $V_{CC}$ and $V_{EE}$ |
| L4 | $V_{CC}$ | GND |

**Table 3. Layer Stack**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# Bill of Materials

### SY58028U Evaluation Board

| Item | Part Number | Manufacturer | Description | Qty. |
|---|---|---|---|---|
| C1-C6, C11-C16, C18 | VJ0402Y104KXXAT | Vishay[1] | 0.1uF, 25V, 10% Ceramic Capacitor, Size 0402, X7R, Dielectric | 13 |
| C7-C10 | CRCW0402000Z | Vishay[1] | 0Ω, 1/16W Resistor SMD, Size 0402 | 4 |
| C17 | 293D685X0025B2T | Vishay[1] | 6.8uF, 20V, Tantalum Electrolytic Capacitor, Size C | 1 |
| R1, R2 | CRCW04023001F | Vishay[1] | 3KΩ, 10%, 1/16W Resistor SMD, size 0402 | 2 |
| J1 | 111-0703-001 | Johnson Components[2] | Black Banana Jack | 1 |
| J2 | 111-0702-001 | Johnson Components[2] | Red Banana Jack | 1 |
| SMA1-SMA12 | 142-0701-851 | Johnson Components[2] | Jack Assembly End Launch SMA | 12 |
| SW1 | CT2182LPST-ND | Digi-Key[3] | 2-Position Dip | 1 |
| U1 | **SY58028U** | **Micrel, Inc.**[4] | 2.5/3.3V Ultra-Precision 4:1 MUX with 1:2 Fanout and Internal Termination | 1 |

### Additional Components for AC-Coupled Outputs

| Item | Part Number | Manufacturer | Description | Qty. |
|---|---|---|---|---|
| C7-C10 | VJ0402Y104KXXAT | Vishay[1] | 0.1uF, 25V, 10% Ceramic Capacitor, Size 0402, X7R, Dielectric | 4 |

**Notes**:

1. Vishay: www.vishay.com.
2. Johnson Components: www.johnsoncomponents.com.
3. Digi-Key: www.digikey.com.
4. **Micrel, Inc**.: www.micrel.com.

## SY58029/30U Evaluation Board

| Item | Part Number | Manufacturer | Description | Qty. |
|---|---|---|---|---|
| C17-C19 | 293D685X0025B2T | Vishay[1] | 6.8uF, 20V, Tantalum Electrolytic Capacitor, Size C | 2 |
| C2-C6, C11-C16 C18, C20 | VJ0402Y104KXXAT | Vishay[1] | 0.1uF, 25V, 10% Ceramic Capacitor, Size 0402, X7R, Dielectric | 13 |
| C7-C10 | CRCW0402000Z | Vishay[1] | 0Ω, 1/16W Resistor SMD, Size 0402 | 4 |
| R1, R2 | CRCW04023001F | Vishay[1] | 3KΩ, 10%, 1/16W Resistor SMD, size 0402 | 2 |
| J1 | 111-0703-001 | Johnson Components[2] | Black Banana Jack | 1 |
| J2, J3 | 111-0702-001 | Johnson Components[2] | Red Banana Jack | 2 |
| SMA1-SMA12 | 142-0701-851 | Johnson Components[2] | Jack Assembly End Launch SMA | 12 |
| SW1 | CT2182LPST-ND | Digi-Key[3] | 2-Position Dip | 1 |
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### Additional Components for AC-Coupled Outputs

| Item | Part Number | Manufacturer | Description | Qty. |
|---|---|---|---|---|
| C7-C10 | VJ0402Y104KXXAT | Vishay[1] | 0.1_F, 25V, 10% Ceramic Capacitor, Size 0402, X7R, Dielectric | 4 |
| R3-R6 | CRCW040249R9F<br>CRCW04021000F | Vishay[1] | 10% 1/16W Resistor SMD, size 0402, Note 5 | 4 |

**Notes**:

1. Vishay: www.vishay.com.
2. Johnson Components: www.johnsoncomponents.com.
3. Digi-Key: www.digikey.com.
4. **Micrel, Inc**.: www.micrel.com.
5. For 2.5V operation: R1-R6 are 50Ω resistors: For 3.3V operation: R1-R6 are 100Ω resistors.

## Micrel Cross Reference

To find an equivalent Micrel part, go to Micrel's website at: **http://www.micrel.com** and follow the steps below:

1. Click on Dynamic Cross Reference.
2. Enter competitor's part number in the Dynamic Cross Reference field.
3. To download a PDF version of this information, click on the Cross Reference PDF tab.

## HBW Support

Hotline: 408-955-1690

Email Support: **HBWHelp@micrel.com**

## Application Hints and Notes

For application notes on high speed termination on PECL and LVPECL products, clock synthesizer products, SONET jitter measurement, and other High Bandwidth products go to Micrel's website at http://www.micrel.com/. Once in Micrel's website, follow the steps below:

1. Click on "Product Info."
2. In the Applications Information Box, choose "Application Hints and Application Notes."

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