SY54017R/AR Evaluation Board

Low Voltage 1.2V/1.8V CML Differential 2:1 MUX (with FAIL SAFE INPUTS)

General Description

The SY54017R and SY54017AR evaluation boards are designed for convenient set-up and quick evaluation of the respective devices. They allow the user to evaluate the part over the full voltage-range of the parts without requiring any modifications to the board.

The evaluation board standard configuration is AC-coupled inputs with DC-coupled outputs for direct interface to a 50Ω-compatible oscilloscope. For applications that require a DC-coupled configuration, step-by-step instructions for modifying the board are included.

All datasheets and support documentation can be found at Micrel's web site at: www.micrel.com.

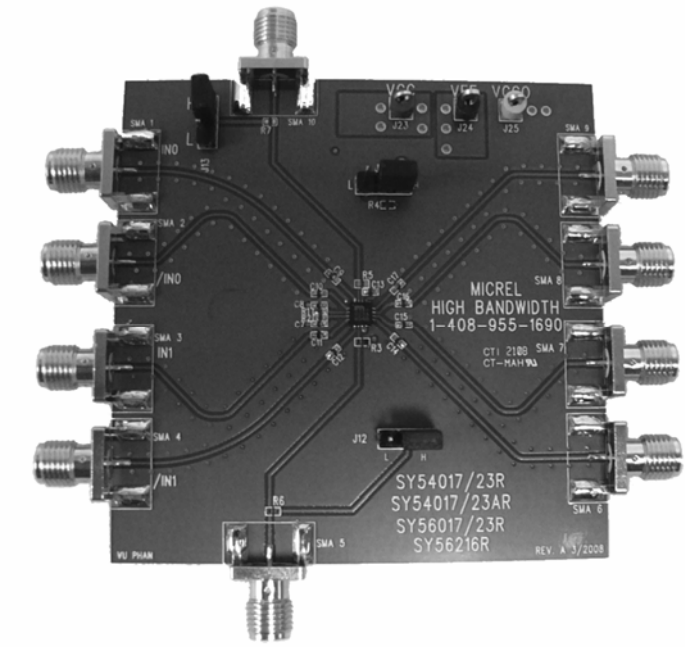
Features

- SY54017R/AR 1.2V/1.8V CML outputs
- Single +2.5V VCC with 1.2V/1.8V VCCO supply
- AC-coupled configuration for ease-of-use
- I/O interface includes on-board termination
- Fully assembled and tested
- Reconfigurable for DC-coupled operation

Applications

- SY54017R Low Voltage 1.2V/1.8V CML Differential 2:1 MUX with Fail Safe Inputs Datasheet
- SY54017AR Low Voltage 1.2V/1.8V CML Differential 2:1 MUX Datasheet

Evaluation Board



Evaluation Board Description

The SY54017R and SY54017AR share a common evaluation board. The boards are designed to accept either AC-coupled or DC-coupled inputs, however, all boards are shipped with DC-Coupled outputs. The DC-coupled outputs allow the CML output to be connected directly to a scope with the standard termination of 50Ω-to-ground. This is accomplished by tying the body of the SMA connectors to the V_{CCO} supply on the evaluation board so that the scope termination appears as 50Ω-to-V_{CCO} on the board. This allows the body of the SMA connectors, which are scope GND, to appear at the same potential as V_{CCO} for the CML output drivers.

The default configuration for the boards is AC-Coupled inputs and DC-Coupled outputs and all boards are shipped with this configuration. The choice between two configurations, AC-Coupled or DC-Coupled, offers the user flexibility in selecting the board that is right for his particular application.

Step-by-step instructions for modifying an AC-coupled evaluation board for DC-coupled operation are supplied in the section "Modifying your AC-Coupled Board for DC-Coupled Operation."

If the output is connected to an AC-coupled 50Ω termination, the 1.2V operation may not work due to a 200mV output level shift from the output coupling capacitors.

SY54017R/AR AC-Coupled Evaluation Board (AC-Coupled Input, DC-Coupled Output)

For a 1.2V output configuration, the V_{CC} of the board is set to 2.5V and the V_{CCO} is set to 1.2V. For a 1.8V output configuration the V_{CCO} is set to 1.8V. For both the 1.2V and 1.8V configuration the V_{EE} is set to 0V.

Setting up the AC-Coupled Evaluation Board (AC-Coupled Input, DC-Coupled Output)

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

Setting up the Power Supplies:

1. Set the voltage setting for a DC supply to 2.5V and turn off the supply.
2. Set the voltage setting for a second DC supply to be either 1.2V or 1.8V and turn off the supply.
3. Connect the negative terminal of the two power supplies together and connect to the V_{EE} terminal of the evaluation board.
4. Do not earth ground either supply.
5. Turn on the power supplies and verify that the 2.5V supply current is <35mA and 1.2V/1.8V supply is <25mA.
6. Turn off the power supplies.

Setting up the AC-Coupled Input

1. Using a differential signal source set the HIGH level of each side of the differential pair to be 0.4V and the LOW level to be 0V. Note that for AC-coupled inputs, only the signal swing is significant, since the inputs will be re-biased after the series capacitor. The amplitude of the input swing can be any value between 100mV and 1.0V.
2. Using equal length 50Ω impedance coaxial cables, connect the signal source to the desired input (Pin 1 and Pin 16 for IN0; Pin 4 and Pin5 for IN1). The desired input needs to be selected through the SEL pin (Pin 15), which is connected to the J13 jumper. Please refer to Table 1 below for proper selection of input.
3. If an external clock signal is used to drive the SEL pin for testing purposes, please add a 50Ω resistor to R5 in order to terminate the trace. In addition, remove R7.

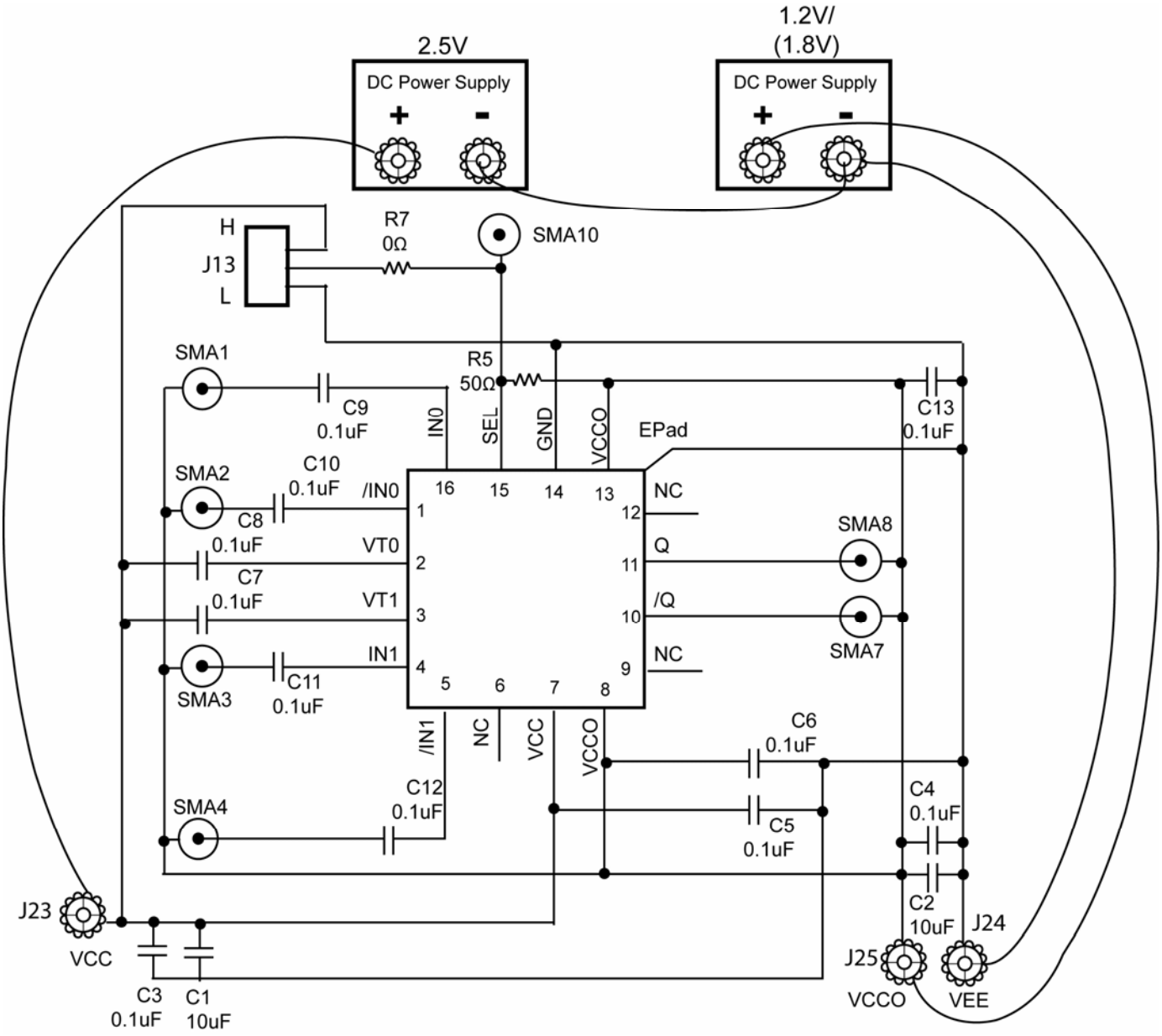
SEL/J13	OUTPUT
0	IN0 Input Selected
1	IN1 Input Selected

Table 1. Truth Table

Setting up the DC-Coupled Output

1. Using equal length 50Ω impedance coaxial cables connect the SMA outputs of the evaluation board (Pin 10 and Pin 11 for Q) to the oscilloscope or other measurement device that has an internal DC-Coupled 50Ω termination. If only one output is connected to the oscilloscope, the complementary output must still be terminated with a 50Ω termination.
2. Turn on the power supplies and verify that the 2.5V supply current is <35mA and 1.2V/1.8V supply is <25mA.
3. Enable the signal source and monitor the outputs.

Evaluation Board



SY54017R and SY54017AR AC-Coupled Evaluation Board

Power Supply	V_{CC}	V_{CCO}	V_{EE}	I/O
1.2V Output	2.5V	1.2V	0V	AC-Coupled Input/DC-Coupled Output
1.8V Output	2.5V	1.8V	0V	AC-Coupled Input/DC-Coupled Output

Table 2. SY54017R/AR AC-Coupled Evaluation Board Power Supply Connections

Bill of Materials

SY54017R/AR Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C5-C13	VJ0402Y104KXXAT	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	9
C1,C2	293D106X0010	Vishay[1]	10µF, 20V, Tantalum Electrolytic Capacitor, Size C	2
C3, C4	VJ0805Y104KXXAT	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0805	2
R7	CRCW040200R0F	Vishay[1]	0Ω, 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	1
R5	CRCW040249R9F	Vishay[1]	50Ω 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	1
J23			Red Test Point (V_{CC})	1
J24			Black Test Point (GND)	1
J25			Yellow Test Point (V_{EE})	1
J13	PZC365FBN	Vishay[1]	3-pin Jumper	1
SMA1-SMA4, SMA7, SMA8, SMA10	142-0701-851	Johnson Components[2]	Jack Assembly End Launch SMA	7
U1	**SY54017R/AR**	**Micrel [3]**	Low Voltage 1.2V/1.8V CML Differential Line Driver/Receiver	1

Notes:

1. Vishay: www.vishay.com.
2. Johnson Components: www.johnsoncomponents.com.
3. Micrel, Inc.: www.micrel.co

Additional Bill of Materials for SY54017R/AR DC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C9-C12	CRCW040200R0F	Vishay[1]	Replace with 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	4
R1,R2	CRCW040200R0F	Vishay[1]	Add 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	2

Notes:

1. Vishay: www.vishay.com

PC Board Layout

Board Layout

The evaluation boards are constructed with Rogers 4003 material, are co-planer in design, fabricated to minimize noise, achieve high bandwidth and minimize crosstalk.

L1	Signal
L2	V_{CCO} Power
L3	V_{CC} Power
L4	V_{EE} Power
L5	V_{CCO} Power
L6	Signal

Table 3. Layer Stack

Modifying the AC-Coupled Board for DC-Coupled Operation

When DC-Coupling is Necessary

For applications where AC-coupling of the inputs is not appropriate, the board can be reconfigured for DC-coupled input operation.

Reconfiguring AC-Coupled Inputs to be DC-Coupled Inputs

The following procedure details the steps for converting an AC-coupled board to a DC-coupled board.

1. Replace capacitors C9-C12 with 0Ω resistors.
2. Add R1 and R2, 0Ω resistors.

Setting up the SY54017R/AR DC-Coupled Evaluation Board (DC-Coupled Input, DC-Coupled Output)

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

Setting up the Power Supplies

1. Set the voltage setting for a DC supply to be 2.5V and turn off the supply.
2. Set the voltage setting for a second DC supply to be either 1.2V or 1.8V and turn off the supply.
3. Connect the negative terminal of the two power supplies together and connect to the V_{EE} terminal of the evaluation board.
4. Do not earth ground either supply.
5. Turn on the power supplies and verify that the 2.5V supply current is <35mA and 1.2V/1.8V supply is <25mA.
6. Turn off the power supply.

Setting up the DC-Coupled Input

1. Using a differential signal source set the HIGH level of each side of the differential pair to be 0.4V and the LOW level to be 0V. Turn off or disable the outputs of the signal source. Note that when the inputs are DC-coupled they are referenced to V_{CCO} because the body of the SMA connectors is tied to V_{CCO}. That means an input level of 0.4V from the signal source will appear as 0.4V + V_{CCO} to the device. For example, if the HIGH level is 0.4V and the V_{CCO} is 1.8V, the device will see 2.2V at its inputs. Since the maximum input HIGH is V_{CC}, if V_{CC} = 2.5V and VCCO = 1.8V, the maximum HIGH level is 0.7V. Please refer to Table 4 below.

Source Level	V_{CCO}	Input	Max Input for V_{CC}=2.5V
0.7	1.8	2.5	Input ≤ V_{CC}
1.3	1.2	2.5	Input ≤ V_{CC}

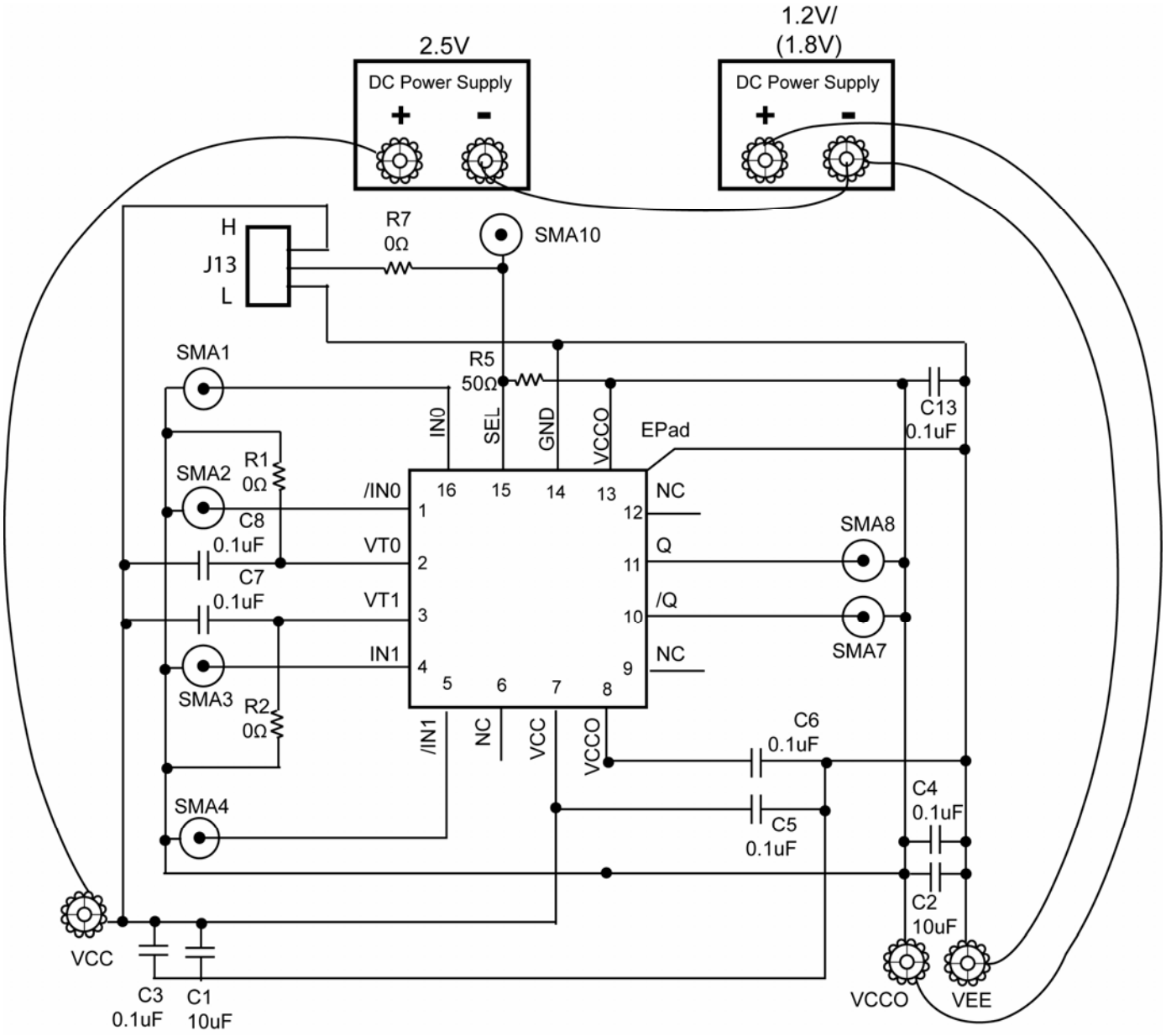
Table 4. Source Levels as a Function of V_{CCO}

2. Using equal length 50Ω impedance coaxial cables, connect the signal source to the desired input, IN0, /IN0 (Pin 16, 1) or IN1, /IN1 (Pin 4, 5). The desired input needs to be selected through the SEL pin (Pin 15), which is connected to the J13 jumper. Please refer to Table 1.
3. If an external clock signal is used to drive the SEL pin for testing purposes, please add a 50Ω resistor to R5 in order to terminate the trace. In addition, remove R7.

Setting up the DC-Coupled Output

1. Using equal length 50Ω impedance coaxial cables, connect the SMA outputs of the evaluation board (Pin 10 and Pin 11) to the oscilloscope or other measurement device that has an internal DC-coupled 50Ω termination. If only one output is connected to the oscilloscope, the complementary output must still be terminated with a 50Ω termination.
2. Turn on the power supplies and verify that the 2.5V supply current is <35mA and 1.2V/1.8V supply is <25mA.
3. Enable the signal source and monitor the outputs.

Evaluation Board



SY54017R and SY54017AR DC-Coupled Evaluation Board

Power Supply	V_{CC}	V_{CCO}	V_{EE}	I/O
1.2V Output	2.5V	1.2V	0V	DC-Coupled Input/DC-Coupled Output
1.8V Output	2.5V	1.8V	0V	DC-Coupled Input/DC-Coupled Output

Table 5. SY54017R/AR DC-Coupled Evaluation Board Power Supply Connections

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 product go to Micrel Inc., 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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