SY54016R/AR Evaluation Board

Low Voltage 1.2V/1.8V CML Differential Line Driver/Receiver with Fail Safe Input

General Description

The SY54016R and SY54016AR 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.

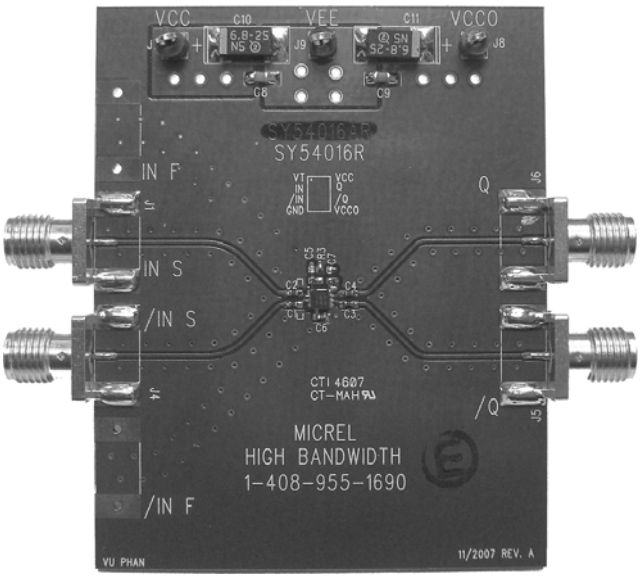
Features

- SY54016R/AR 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

- SY54016R Low Voltage 1.2V/1.8V CML Differential Line Driver/Receiver with Fail Safe Input Datasheet
- SY54016AR Low Voltage 1.2V/1.8V CML Differential Line Driver/Receiver Datasheet

Evaluation Board



Evaluation Board Description

The SY54016R and SY54016AR share a common evaluation board. The individual evaluation boards are labeled to identify the specific device, either SY54016R or SY54016AR. 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 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 subsection “Modifying your AC-Coupled Board for DC-Coupled Operation.”

SY54016R/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. Turn on the power supply and verify that the power supply current is <40mA.
5. Turn off the power supply.

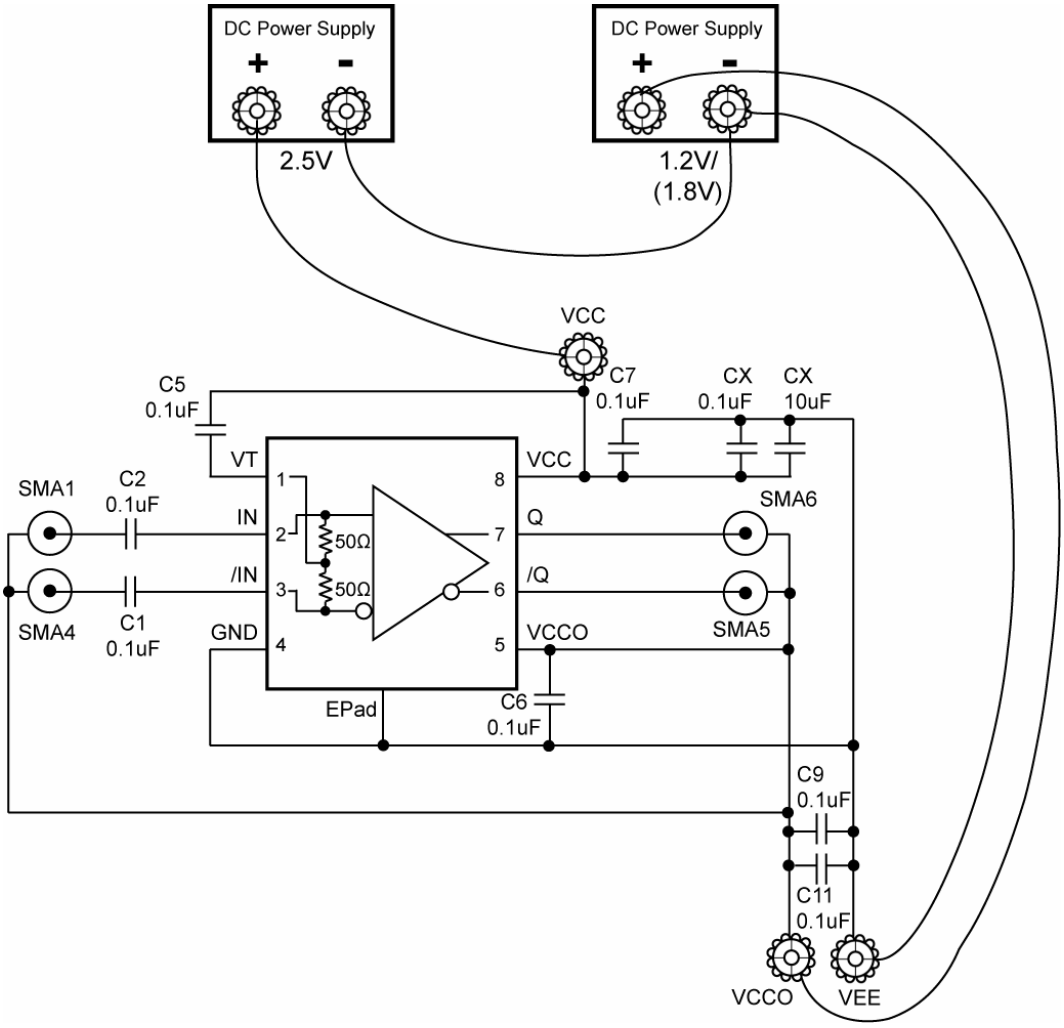
Setting up the AC-Coupled Input

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. Use equal length 50Ω impedance coaxial cables to connect the signal source to the SMA inputs on the evaluation board (Pin 1 and Pin 4).

Setting up the DC-Coupled Output

1. Use equal length 50Ω impedance coaxial cables to connect the SMA outputs of the evaluation board (Pin 7 and Pin 6) to the oscilloscope or other measurement device that has an internal 50Ω termination. If only one output is connected to the oscilloscope, then the complementary output must still terminate with a 50Ω termination.
2. Turn on the power and verify the current is <40mA.
3. Enable the signal source and monitor the outputs.

Evaluation Board



SY54016R and SY54016AR 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 1. SY54016R/AR AC-Coupled Evaluation Board Power Supply Connections

Bill of Materials

SY54016R/AR Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C4, C5, C6, C7	VJ0402Y104KXXAT	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	7
C10, C11	293D685X0010	Vishay[1]	6.8µF, 20V, Tantalum Electrolytic Capacitor, Size C	2
C8, C9	VJ0805Y104KXXAT	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0805	2
J1			Red Test Point (V_{CC})	1
J2			Black Test Point (GND)	1
J3			Yellow Test Point (V_{EE})	1
SMA1, SMA4, SMA5, SMA6	142-0701-851	Johnson Components[2]	Jack Assembly End Launch SMA	4
U1	**SY54016R/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.com.

Additional Bill of Materials for SY54016R/AR DC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2	CRCW040200R0F	Vishay[1]	Replace with 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	2
R3	CRCW040200R0F	Vishay[1]	Add 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	1

Notes:

1. Vishay: www.vishay.com.

PC Board Layout

Board Layout

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

L1	Signal/V_{CCO}
L2	Impedance V_{CCO}
L3	V_{CC} Power/V_{EE} Power
L4	Signal/ V_{CCO}

Table 2. 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 C1 and C2 with 0Ω resistors.
2. Add R3, 0Ω resistor.

Setting up the SY54016R/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 either 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. Turn on the power supply and verify that the power supply current is <40mA.
5. 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.

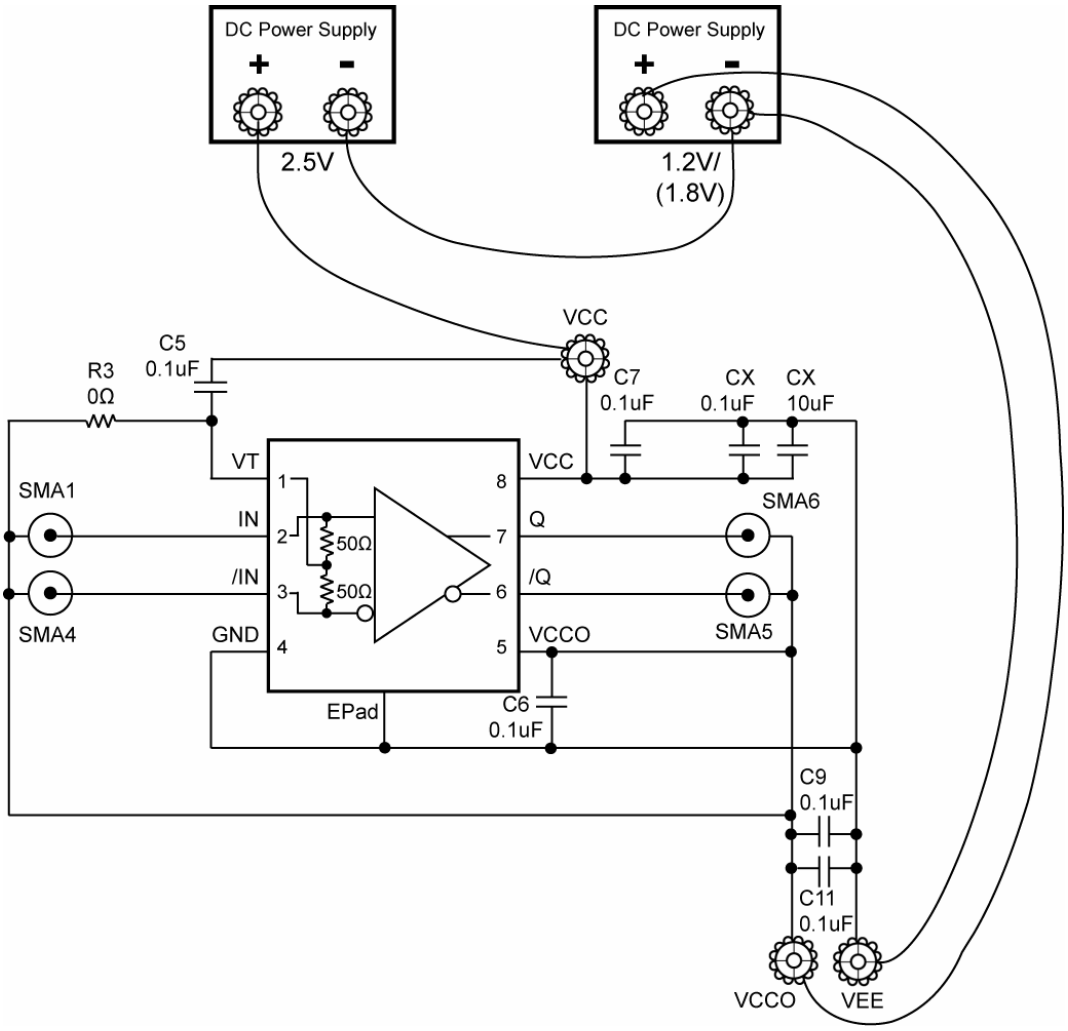
Source Level	V_{CCO}	Input	Max Input for V_{CC} = 2.5V
0.7	1.8	2.5	Input $\leq V_{CC}$
1.3	1.2	2.5	Input $\leq V_{CC}$

Table 3. Source Levels as a Function of V_{CCO}

2. Using equal length 50Ω impedance coaxial cables, connect the signal source to the SMA inputs on the evaluation board (Pin 1 and Pin 4).

Setting up the DC-Coupled Output

1. Use equal length 50Ω impedance coaxial cables to connect the SMA outputs of the evaluation board (Pin 7 and Pin 6) to the oscilloscope or other measurement device that has an internal 50Ω termination.
2. Turn on the power and verify the current is <40mA.
3. Enable the signal source and monitor the outputs.



SY54016R and SY54016AR 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 4. SY54016R/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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