



PECL/ECL Differential Receiver/Buffer

SY89206V/216V Evaluation Board
SY89306V/316V Evaluation Board

General Description

The SY89206V, SY89216V, SY89306V and SY89316V evaluation boards are designed for convenient setup and quick evaluation of the respective devices. The boards are optimized to interface directly to a 50Ω oscilloscope.

The default evaluation board I/O configuration is AC-Coupled. For applications that require a DC-Coupled configuration, step-by-step instructions for modifying the board are included.

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

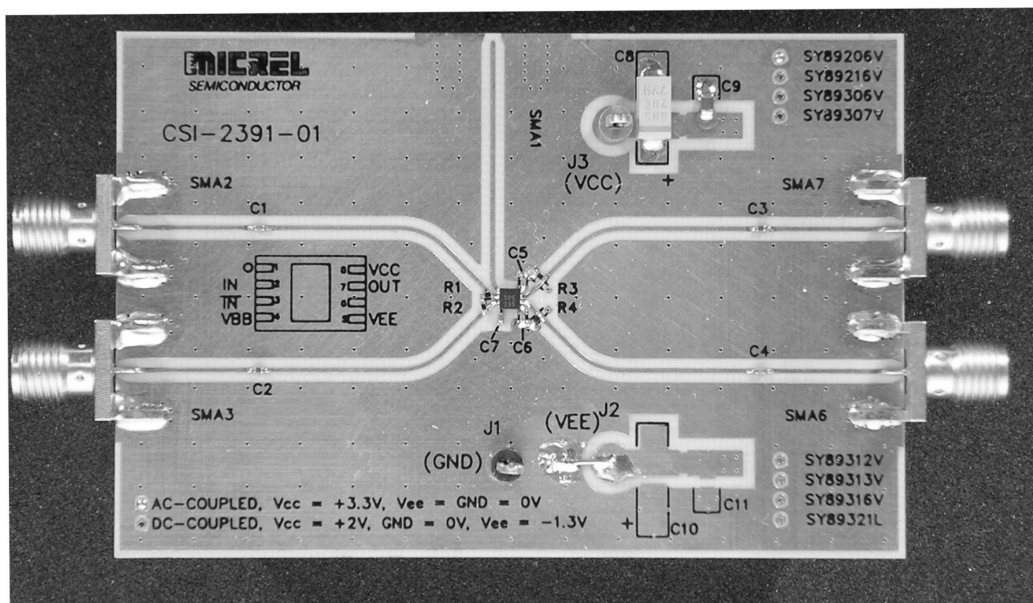
Features

- SY89206V and SY89216V
- SY89306V and SY89316V
- Single +3.3V or +5V power supply
- AC-coupled configuration for ease-of-use
- I/O interface includes on-board termination
- Fully assembled and tested
- Can be reconfigured for DC-coupled operation

Related Documentation

- SY89206V/216V, 3.3V/5V 1GHz Differential PECL/ECL Receiver/Buffer Data Sheet
- SY89306V/316V, 3.3V/5V 2.5GHz Differential PECL/ECL Receiver/Buffer Data Sheet

Evaluation Board



Evaluation Board Description

The SY89206V, SY89216V, SY89306V and SY89316V share a common evaluation board. The individual evaluation boards are labeled to identify the specific device and the configuration, either AC- or DC-coupled configuration, for that board.

The default configuration for these boards is the AC-Coupled configuration. The choice between two configurations offers the user flexibility in selecting the board that is right for his particular application.

AC-Coupled Evaluation Board

The AC-coupled configuration is suited to most customer applications and is preferred by the majority of users because of its ease-of-use. It requires only a single power supply of either 3.3V +10% or 5.0V +10% and offers the most flexibility in interfacing to a variety of signal sources.

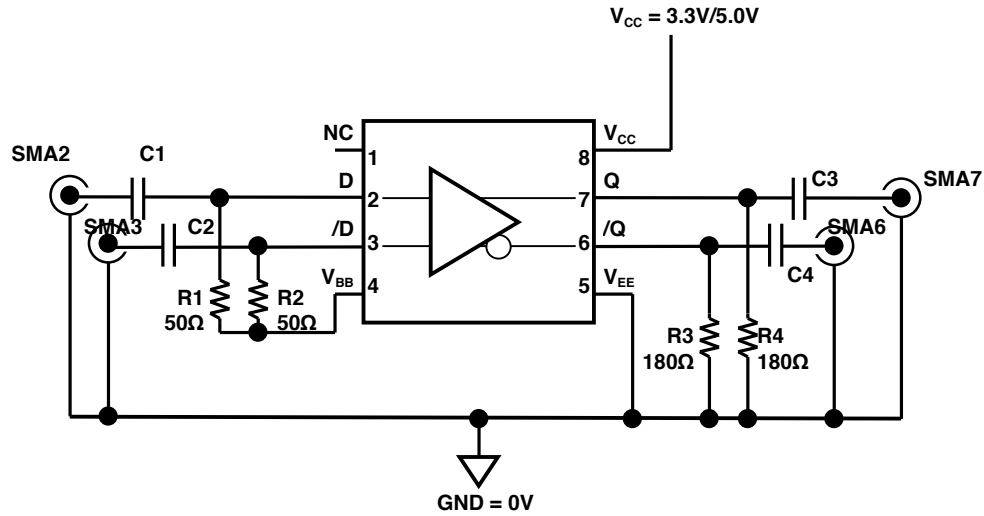
The DC-bias levels and AC-Coupling capacitors are supplied on-board for each input, making it unnecessary to vary the offset voltage or change any components on the board as the power supply voltage varies. The user needs only to supply a minimum input voltage swing and the bias voltage will automatically adjust the input to the correct level as the power supply voltage varies.

DC-Coupled Evaluation Board

For DC-coupled operation, the board can be modified to use two power supplies in a "split-supply configuration." The term split-supply simply means the +3.3V supply is split into a +2V and -1.3V, or for a +5V supply it is split into a +2V and -3V power supply configuration. This effectively offsets the board by +2V. The +2V offset in this two-power supply configuration then provides the correct terminations for the device by setting the Ground potential on the board to be exactly 2 volts below the V_{CC} supply. The V_{EE} voltage is then set to -1.3V for 3.3V devices or -3.0V for 5V devices so the device power pins still see a full 3.3V or 5V potential between V_{CC} and V_{EE} .

Step-by-step instructions for modifying an AC-coupled evaluation board for DC-coupled operation can be found in "Modifying your AC-Coupled Board for DC-Coupled Operation" section.

Evaluation Board



AC-Coupled Evaluation Board

I/O	Power Supply	V _{CC}	GND	V _{EE}
AC-Coupled Input/AC-Coupled Output	3.3V System	+2V	0V	0V
AC-Coupled Input/AC-Coupled Output	5V System	+2V	0V	0V

Table 1. AC-Coupled Evaluation Board Power Supply Connections

Bill of Materials

AC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C4	VJ0402Y104KXXAT	Vishay ⁽¹⁾	0.1μF, 25V, 10% Ceramic Capacitor, Size 0402, X7R, Dielectric	5
C5, C6	VJ0402Y103KXXAT	Vishay ⁽¹⁾	0.01μF, 25V, 10% Ceramic Capacitor, Size 0402, X7R, Dielectric	2
C8	293D685X0025BT	Vishay ⁽¹⁾	6.8 μF, 20V, Tantalum Electrolytic Capacitor, Size C	1
C9	VJ0805Y103KXXAT	Vishay ⁽¹⁾	0.01μF, 25V, 10% Ceramic Capacitor, Size 0805	1
J1	5011K-ND	Digi-Key ⁽²⁾	PC Test Point Multi-purpose Black	1
J3	5011K-ND	Digi-Key ⁽²⁾	PC Test Point Multi-purpose Red	1
R1, R2	CRCW040249R9F	Vishay ⁽¹⁾	49.9Ω, 1/16W, 5% Thick-film Resistor, Size 0402	2
R3, R4	CRCW04021800F	Vishay ⁽¹⁾	180Ω, 1/16W, 5% Thick-film Resistor, Size 0402	2
SMA1-SMA3 SMA6, SMA7	142-0701-851	Johnson Components ⁽³⁾	Jack Assembly End Launch SMA	4
U1	SY89206/216V or SY89306/316V	Micrel, Inc. ⁽⁴⁾	PECL/ECL Differential Receiver/Buffer	1

Notes:

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

AC-Coupled Evaluation Board Setup

Setting up the AC-Coupled Evaluation Board

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

1. Set the voltage setting for a DC supply to be either 3.3V or 5.0V depending on your application and turn off the supply.
2. Connect the GND terminal to the negative side of a DC power supply. This is the 0V ground potential.
3. Connect the V_{CC} terminal to the positive side of a DC power supply.
4. Turn on the power supply and verify that the power supply current is <100mA.
5. Turn off the power supply.
6. Using a differential signal source set the amplitude of each side of the differential pair to be 800mV (1600mV measured differentially). Set the offset to be a positive value, the value of this offset is not critical, as the AC-Coupled inputs will be automatically biased to the correct offset. Turn off or disable the outputs of the signal source.
7. Using equal length 50Ω impedance coaxial cables, connect the signal source to the inputs on the evaluation board (SMA2 and SMA3).
8. Using equal length 50Ω impedance coaxial cables, connect the outputs of the evaluation board (SMA6 and SMA7) to the oscilloscope or other measurement device that has an internal 50Ω termination.
9. Turn on the power and verify the current is <100mA.
10. Enable the signal source and monitor the outputs.

Evaluation Board Layout

PC Board Layout

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

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

Table 2. Layer Stack

Modifying DC-Coupled Outputs for AC-Coupled Operation

When DC-Coupling is Necessary

For applications where AC-Coupling is not appropriate, the board can be reconfigured for DC-Coupling is required is if the input data or clock can be disabled. This would result in a DC-signal at the inputs and the on-board biasing resistors (R1 and R2) would apply the same level to both the true and complement inputs. Since these inputs are differential this would result in an intermediate non-differential state at the inputs and the outputs would be in an indeterminate condition. Reconfiguring the board for DC-coupled operation and using two power supplies can avoid this condition.

Reconfiguring an AC-Coupled Board into a DC-Coupled Board

The following procedure details the steps for converting an AC-Coupled board to a DC-Coupled board:

1. Remove resistors R3 and R4.
2. Remove resistors R1 and R2 and reposition them as shown in the loading diagram.
3. Replace capacitors C1, C2, C3 and C4 with 0Ω resistors.
4. Remove the soldered-wire shorting bar between J2 (V_{EE}) and the ground plane.
5. Install components J2, C10 and C11. These locations should look like the components in J3, C8 and C9.
6. For easy identification, remove the solder dot from the adjacent to the AC-coupled silkscreen label on the front of the board and add a solder dot to the DC-Coupled via.

Setting up the DC-Coupled Evaluation Board

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

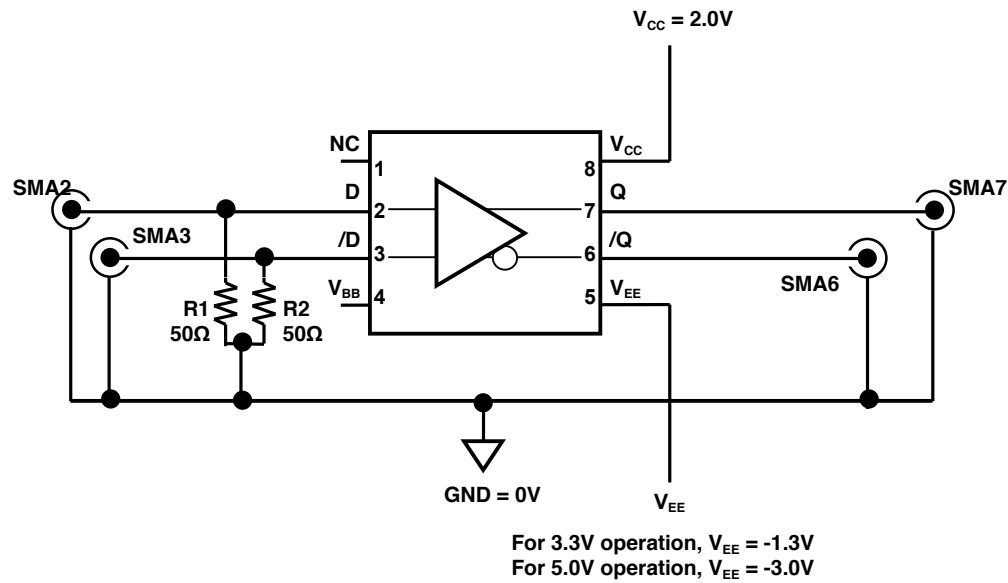
1. Set the voltage for DC supply number 1 to be 2.0V and connect it to J3 (V_{CC}).
2. Set the voltage for DC supply number 2 to be -1.3V (for 3.3V operation) or -3.0V (for 5.0V operation) and connect it to J3 (V_{EE}).
3. Connect the negative side of power supply 1 to the positive side of power supply 2. This is the 0V ground potential for the board.
4. Turn off the power supplies and connect the GND terminal on the board to the negative side of a DC power supply 1 and the positive side of DC power supply 2
5. Turn on the power supply and verify that the power supply current is <100mA. Using a voltmeter.
6. Turn off the power supply.
7. Disable the outputs of the differential signal source and set the $V_{OH} = V_{CC} - 1.0V$ and the $V_{OL} = V_{CC} - 1.75V$ as shown in the following table.

I/O Voltage Level	+3.3V Supply	+5.0V Supply
$V_{OH} = V_{CC} - 1.0V$	+2.3V	+4.0V
$V_{OL} = V_{CC} - 1.75V$	+1.55V	+3.25V

Table 3. Power Supply Table

8. Using equal length 50Ω impedance coaxial cables, connect the signal source to the inputs on the evaluation board (SMA2 and SMA3).
9. Using equal length 50Ω impedance coaxial cables, connect the outputs of the evaluation board (SMA6 and SMA7) to the oscilloscope or other measurement device that has an internal 50Ω termination.
10. Turn on the power and verify the current is <100mA.
11. Enable the signal source and monitor the outputs.

Evaluation Board

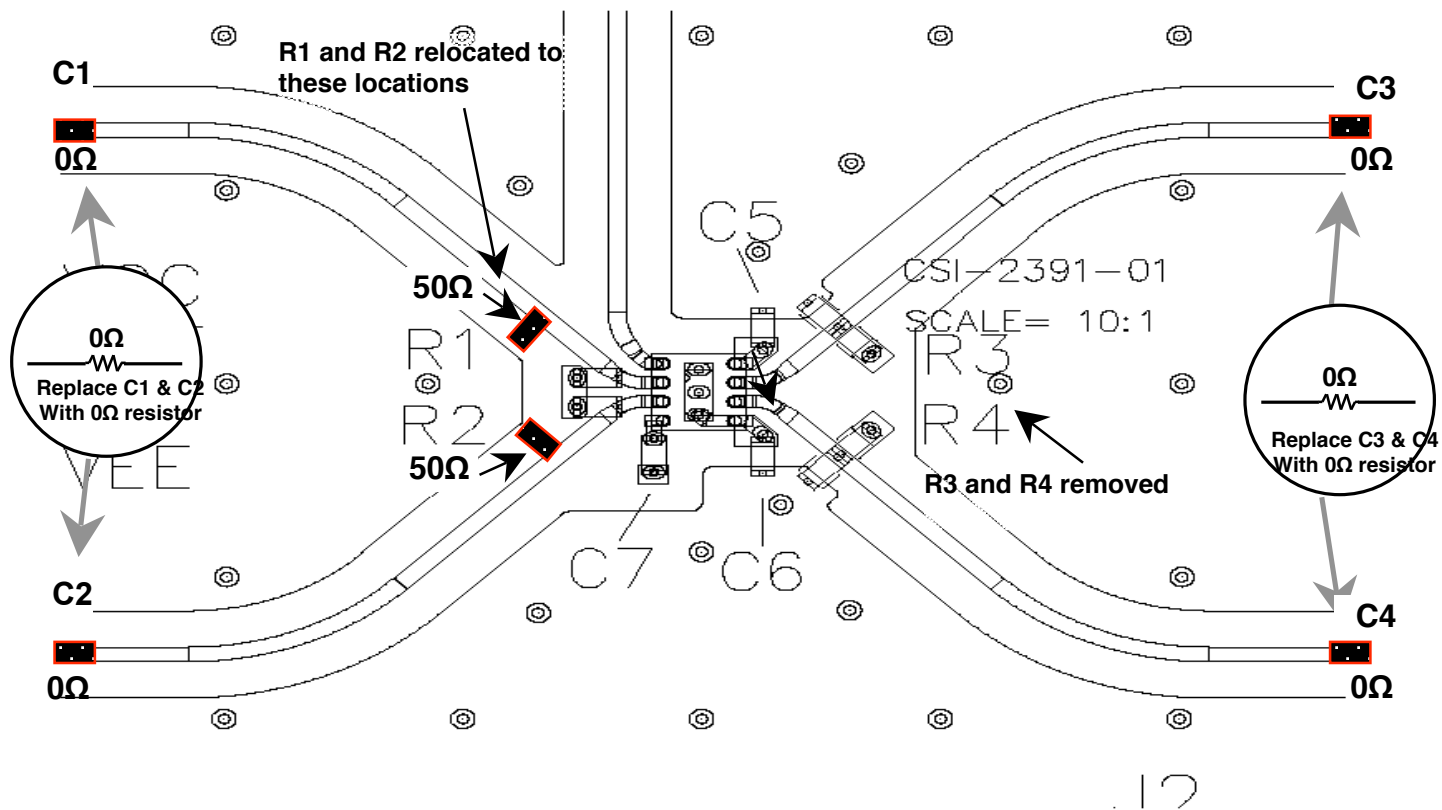


DC-Coupled Evaluation Board

I/O	Power Supply	V_{CC}	GND	V_{EE}
AC-Coupled Input/AC-Coupled Output	3.3V System	+2V	0V	-1.3V
AC-Coupled Input/AC-Coupled Output	5V System	+2V	0V	-3.0V

Table 4. DC-Coupled Evaluation Board Power Supply Connections

Loading Diagram



Bill of Materials

DC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C4	CRCW040200R0F	Vishay ⁽¹⁾	Replace capacitors with resistors: 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402	4
C10	293D685X0025BT	Vishay ⁽¹⁾	6.8μF, 20V, Tantalum Electrolytic Capacitor, Size C	1
C11	VJ0805Y103KXXAT	Vishay ⁽¹⁾	0.01μF, 25V, 10% Ceramic Capacitor, Size 0805	1
J2	5011K-ND	Digi-Key ⁽²⁾	PC Test Point Multi-purpose Red	1

Notes:

1. Vishay: www.vishay.com
2. Digi-Key: www.digikey.com

Micrel Cross Reference

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

Click on Dynamic Cross Reference

Enter competitor's part number in the Dynamic Cross Reference field

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 product 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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