Enhanced Differential Receiver

SY89250V Evaluation Board

General Description

The SY89250V evaluation board is designed for convenient setup and quick evaluation of the SY89250V. The evaluation board standard configuration is AC-Coupled for direct interface to a 50Ω compatible oscilloscope without split supplies. For applications that require a DC-Coupled configuration, step-by-step instructions for modifying the board are included.

The board is fully assembled and tested and is accompanied with all necessary documentation.

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

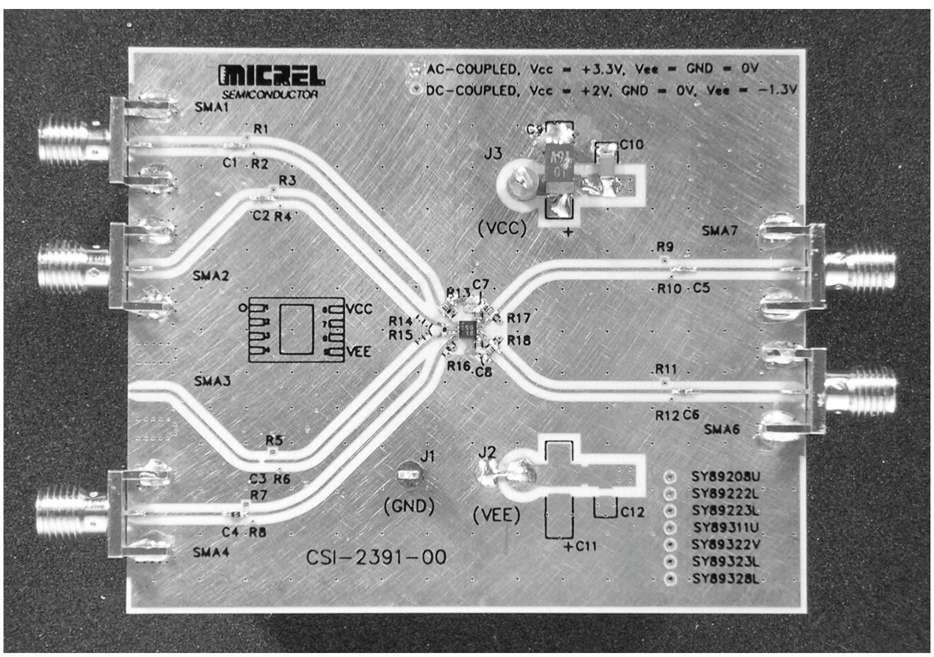
Features

- SY89250V
- 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
- Reconfigurable for DC-Coupled operation

Related Documentation

- SY89250V Enhanced Differential Receiver Data Sheet

Evaluation Board



Evaluation Board Description

The SY89250V evaluation board can be configured for either AC-Coupled or DC-Coupled operation.

The default configuration for the board is the AC-Coupled configuration and the board is shipped with this 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 $\pm$10% or 5.0V $\pm$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 are supplied in the "Modifying your AC-Coupled Board for DC-Coupled Operation" section.

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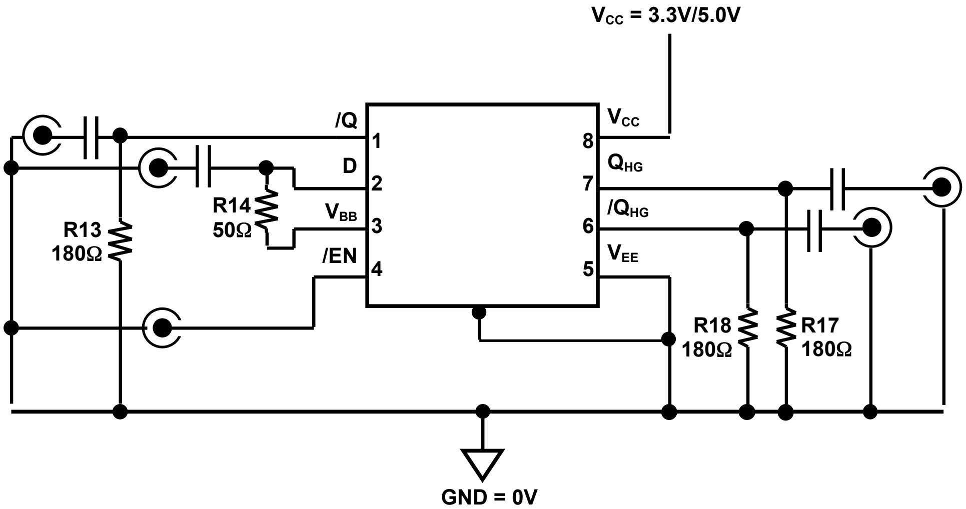
Evaluation Board



AC-Coupled Evaluation Board Power Supply Connections				
Power Supply	**V_{CC}**	**GND**	**V_{EE}**	**I/O**
3.3 Volt System	+3.3V	0V	0V	AC-Coupled Input/AC-Coupled Output
5 Volt System	+5V	0V	0V	AC-Coupled Input/AC-Coupled Output

Table 1. SY89250V Configuration

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

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. On the signal source set the amplitude of the output to be 800mV. Set the offset to be a positive value, the value of this offset is not critical, as the AC-Coupled input will be automatically biased to the correct offset. Turn off or disable the output of the signal source.
7. Using a 50Ω impedance coaxial cable, connect the signal source to the input on the evaluation board (SMA2).
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. Using a third 50Ω impedance coaxial cable, connect the output of the evaluation board (SMA1) 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.

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C5, C6	VJ0402Y104KXXAT	Vishay[1]	0.1μF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	4
C7. C8	VJ0402Y103KXXAT	Vishay[1]	0.01μF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	2
C9	293D685X0025B2T	Vishay[1]	6.8μF, 20V, Tantalum Electrolytic Capacitor, Size C	1
C10	VJ0805Y103KXXAT	Vishay[1]	0.01μF, 25V, 10% Ceramic Capacitor, Size 0805	1
C4	CRCW0402000Z	Vishay[1]	Replace capacitor with resistors: 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402	1
R13, R17, R18	CRCW04021800F	Vishay[1]	180Ω, 1/16W, 5% Thick-film Resistor, Size 0402	3
R14	CRCW0402500F	Vishay[1]	50Ω, 1/16W, 5% Thick-film Resistor, Size 0402	1
J1	111-0703-001	Johnson Components[2]	Black Banana Jack	1
J3	111-0702-001	Johnson Components[2]	Red Banana Jack	1
SMA1, SMA2, SMA4, SMA6, SMA7	142-0701-851	Johnson Components[2]	Jack Assembly End Launch SMA	5
U1	**SY90250V**	**Micrel, Inc.[3]**	Enhanced Differential Receiver	1

Additional Components for AC-Coupled Outputs

Item	Part Number	Manufacturer	Description	Qty.
C11	293D685X0025B2T	Vishay[1]	6.8μF, 20V, Tantalum Electrolytic Capacitor, Size C	1
C12	VJ0805Y103KXXAT	Vishay[1]	0.01μF, 25V, 10% Ceramic Capacitor, Size 0805	1
C1, C2, C5, C6	CRCW0402000Z	Vishay[1]	Replace capacitor with resistor: 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402	4
J2	111-0702-001	Johnson Components[2]	Red Banana Jack	1

Notes:

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

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.

Layer	SY89250V
L1	GND and Signal
L2	Impedance GND
L3	V_{CC} and V_{EE}
L4	GNG and Signal

Table 2. Layer Stack

Modifying AC-Coupled Outputs for DC-Coupled Operation

When DC-Coupling is Necessary

For applications where AC-Coupling is not appropriate, the board can be reconfigured for DC-Coupled operation. An example where 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 resistor (R14 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 R13, R17 and R18.
2. Remove resistor R14 and reposition it as shown in the loading diagram.
3. Replace capacitors C1, C2, C5 and C6 with 0Ω resistors.
4. Remove the soldered-wire shorting bar between J2 (V_{EE}) and the ground plane.
5. Install components J2, C11 and C12. These locations should look like the components in J3, C9 and C10.
6. For easy identification, remove the solder dot 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

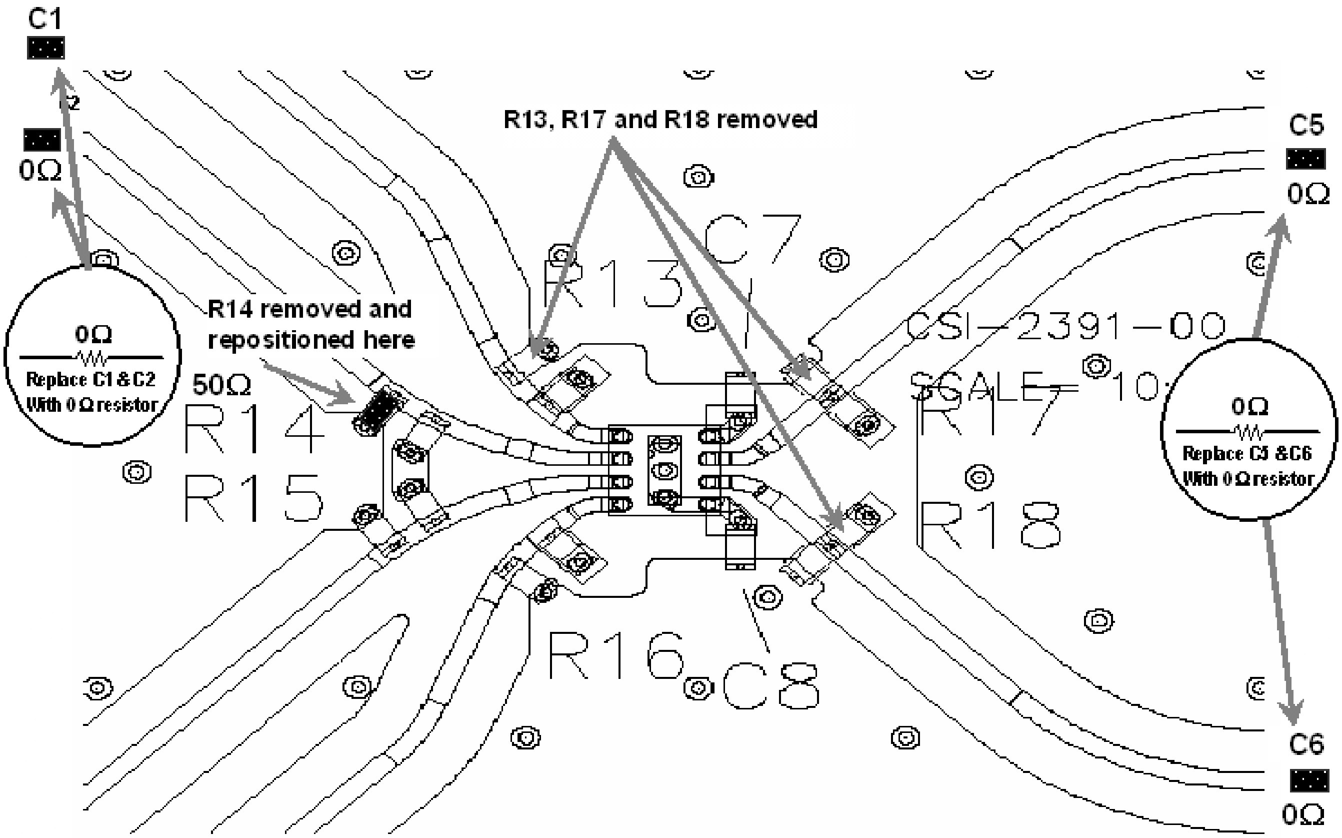
The follow steps describe the procedure for setting up the DC-Coupled evaluation board.

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

8. Using a 50Ω impedance coaxial cable, connect the signal source to the input on the evaluation board (SMA2).
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. Using a 50Ω impedance coaxial cable, connect the output of the evaluation board (SMA1) to the oscilloscope or other measurement device that has an internal 50Ω termination.
11. Turn on the power and verify the current is <100mA.
12. Enable the signal source and monitor the outputs.

Loading Diagram



Micrel Cross Reference

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