3.3/5V, 3GHz PECL and ECL 2:1 Multiplexer

SY89208V Evaluation Board

General Description

The SY89208V evaluation board is designed for convenient setup and quick evaluation of the SY89208V. The boards are optimized to interface directly to a 50Ω oscilloscope.

The default evaluation board I/O configuration is +3.3V AC-coupled inputs and outputs. For applications that require +5V operation or a DC-coupled configuration, step-by-step instructions for modifying the board are included.

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

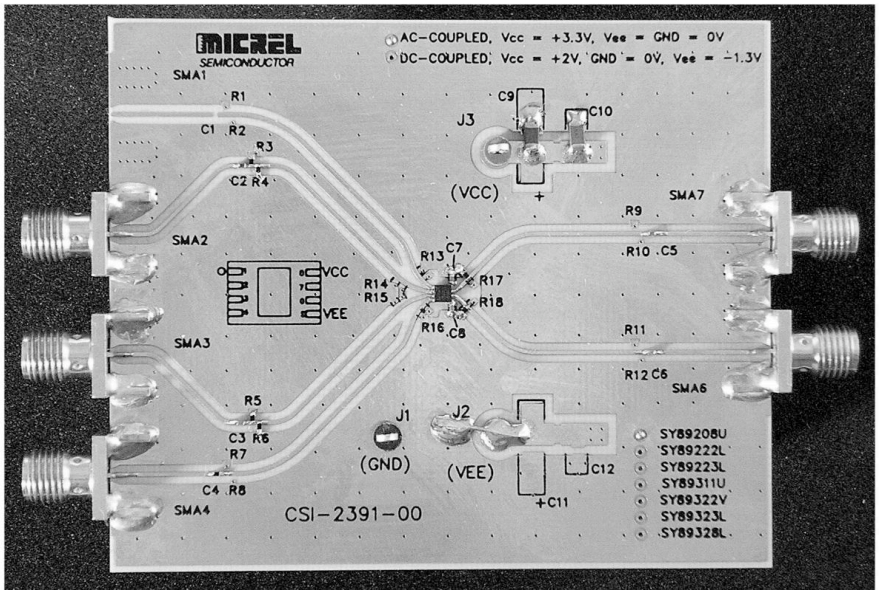
Features

- SY89208V
- 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

- SY89208V, 3.3V/5V 3GHz PECL/ECL 2:1 Multiplexer Data Sheet

Evaluation Board



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Evaluation Board Description

The SY89208V evaluation board is initially configured for +3.3V operation. The board can be easily modified for +5V operation.

The default configuration for the board is the AC-coupled configuration and all boards are 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 ±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 over the +3.3V ±10% operating range. 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.

To modify the +3.3V AC-coupled evaluation board into a +5V AC-coupled evaluation board, resistor values for R3, R4, R5 and R6 need to be changed as shown in the following schematic.

DC-Coupled Evaluation Board

For DC-coupled operation, the board can be modified to use two power supplies in a “split-supply configuration”. Split-supply is an easy method to interface to a 50Ω to ground scope. Therefore, a 3.3V supply will be split into +2V and -1.3V, and a +5V supply will be split into +2V and -3V. 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 to ensure proper V_{CC} to V_{EE} voltage difference.

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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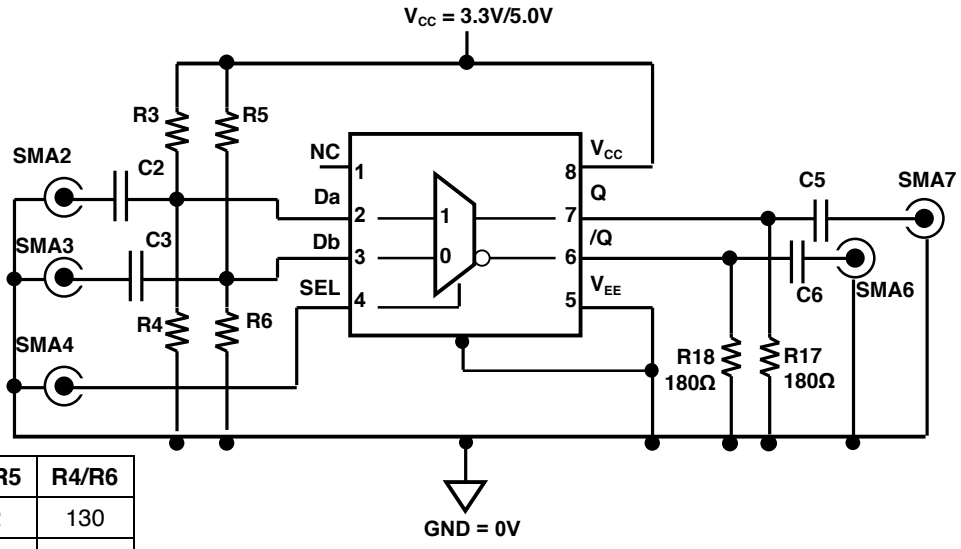
Evaluation Board

AC-Coupled Evaluation Board



V_{CC}	R3/R5	R4/R6
3.3	82	130
5.0	68	192

SY89208V AC-Coupled 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. SY89208V AC-Coupled Configuration

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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 <120mA.
5. Turn off the power supply.
6. Using a single-ended signal sources set the amplitude to be 800mV. 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 50Ω impedance coaxial cables, connect the signal source to the inputs on the evaluation board (SMA2, SMA3 and SMA4).
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 <120mA.
10. Enable the signal source and monitor the outputs.

Bill of Material

+3.3V AC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C2, C3, C5, C6	VJ0402Y104KXXAT	Vishay[1]	0.1μF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	4
C4	CRCW0402000Z	Vishay[1]	Replace capacitor with resistors: 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402	1
C7. C8	VJ0402Y103KXXAT	Vishay[1]	0.01μF, 25V, 10% Ceramic Capacitor, Size 0402, X5R Dielectric	2
C9	293D685X0025B2T	Vishay[1]	6.8μF, 20V, Tantalum Electrolytic Capacitor, Size C	1
C10	VJ1206Y103JXJAT	Vishay[1]	0.01μF, 25V, 10% Ceramic Capacitor, Size 0805	1
R3, R5	CRCW040282R5F	Vishay[1]	82.5Ω, 1/16W, 5% Thick-film Resistor, Size 0402	2
R4, R6	CRCW04021300F	Vishay[1]	130Ω, 1/16W, 5% Thick-film Resistor, Size 0402	2
R17, R18	CRCW04021820F	Vishay[1]	182Ω, 1/16W, 5% Thick-film Resistor, Size 0402	2
J1	111-0703-001	Johnson Components[2]	PC Test point Multi-purpose Black	1
J3	111-0702-001	Johnson Components[2]	PC Test point Multi-purpose Red	1
SMA2, SMA3, SMA4, SMA6, SMA7	142-0701-851	Johnson Components[2]	Jack Assembly End Launch SMA	5
U1	**SY89208U**	**Micrel[3]**	3.3/5V, 3GHz PECL&ECL 2:1 Multiplexer	1

Additional Components for +5V AC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
R3, R5	CRCW0402680F	Vishay[1]	68Ω, 1/16W, 5% Thick-film Resistor, Size 0402	2
R4, R6	CRCW04021920F	Vishay[1]	192Ω, 1/16W, 5% Thick-film Resistor, Size 0402	2

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	SY89208V
L1	GND and Signal
L2	Impedance GND
L3	V_{CC} and V_{EE}
L4	GND and Signal

Table 2. Layer Stack

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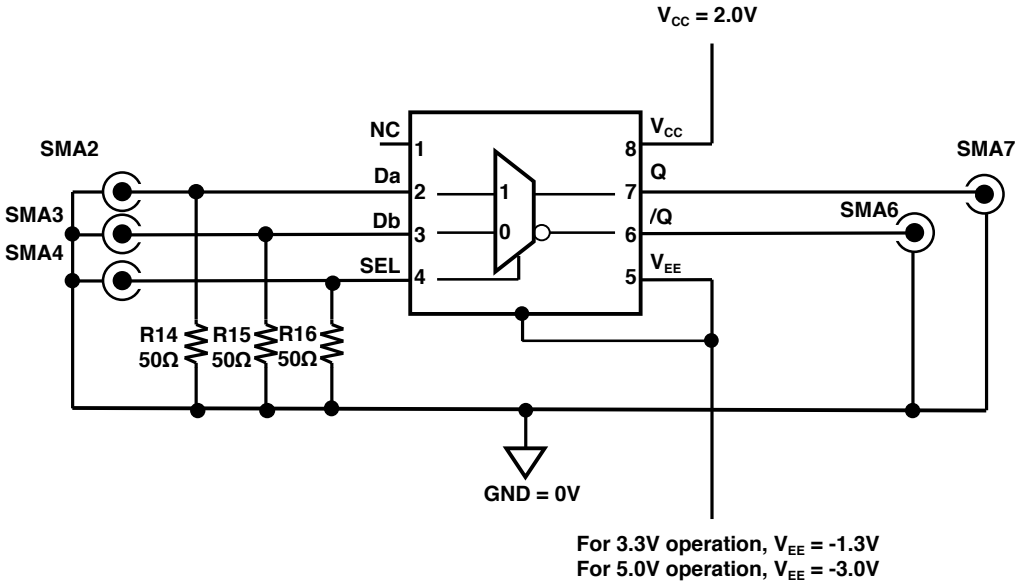
Evaluation Board

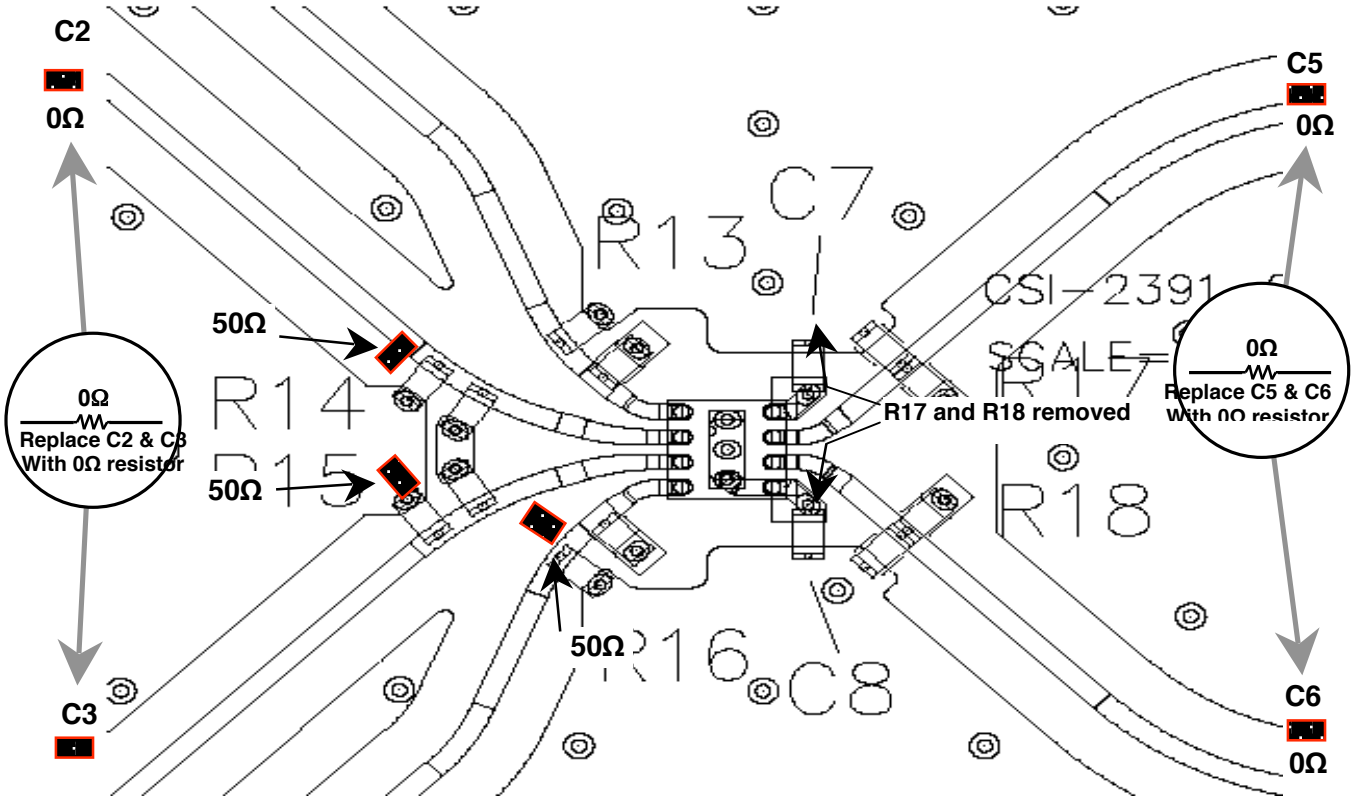


SY89308V DC-Coupled Evaluation Board

DC-Coupled Evaluation Board Power Supply Connections				
Power Supply	**V_{CC}**	**GND**	**V_{EE}**	**I/O**
3.3 Volt System	+2V	0V	–1.3V	AC-Coupled Input/DC-Coupled Output
5 Volt System	+2V	0V	–3.0V	AC-Coupled Input/DC-Coupled Output

Table 3. SY89308V DC-Coupled Configuration

Loading Diagram



SY89208V DC-Coupled Loading Diagram

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 when the input data or clock can be disabled. This would result in a DC-signal at the inputs and the on-board biasing resistors (R3 – R6) 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, R4, R5 and R6 from the inputs.
2. Remove resistors R17 and R18 from the outputs.
3. Replace capacitors C2, C3, 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 from the via 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 <120mA.
6. Turn off the power supply.
7. Disable the outputs of the signal sources 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 coaxial cables, connect the signal sources to the inputs on the evaluation board (SMA2, SMA3 and SMA4).
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 <120mA.
11. Enable the signal sources and monitor the outputs.

Bill of Materials

Additional Bill of Materials for DC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C2, C3, C5, C6	CRCW0402000Z	Vishay[1]	Replace capacitor with resistors: 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402	4
C11	293D685X0025B2T	Vishay[1]	6.8μF, 20V, Tantalum Electrolytic Capacitor, Size C	1
C12	VJ1206Y103JXJAT	Vishay[1]	0.01μF, 25V, 10% Ceramic Capacitor, Size 0805	1
R14, R15, R16	CRCW040249R9F	Vishay[1]	49.9Ω, 1/16W, 1% Thick-film Resistor, Size 0402	3
J2	111-0702-001	Johnson Components[2]	Red Banana Jack	1

Notes:

1. Vishay: www.vishay.com
2. Johnson Components: www.johnsoncomponents.com

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 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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