2.5/3.3V, 1:12 LVPECL Fanout Buffer with 2:1 Input MUX Internal 50Ω Input Termination

SY89112U Evaluation Board

General Description

The SY89112U evaluation board is designed for convenient setup and quick evaluation. It allows the user to evaluate the part over the full voltage-range of the part without requiring any modifications to the board.

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, tested and is accompanied by all necessary documentation.

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

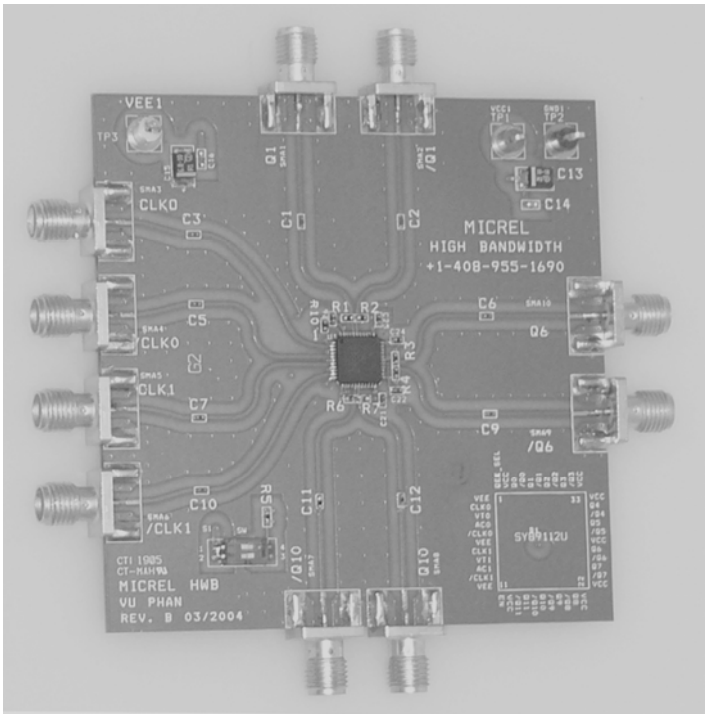
Features

- SY89112U LVPECL outputs
- Single +2.5V or +3.3V 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

- SY89112U 2.5/3.3V, 1:12 LVPECL Fanout Buffer with 2:1 Input MUX Internal 50Ω Input Terminations Data Sheet

Evaluation Board



Evaluation Board Description

The SY89112U evaluation board is designed to operate at 2.5V or 3.3V without modification.

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 +2.5V ±5% or +3.3V ±10% and offers the most flexibility in interfacing to a variety of signal sources.

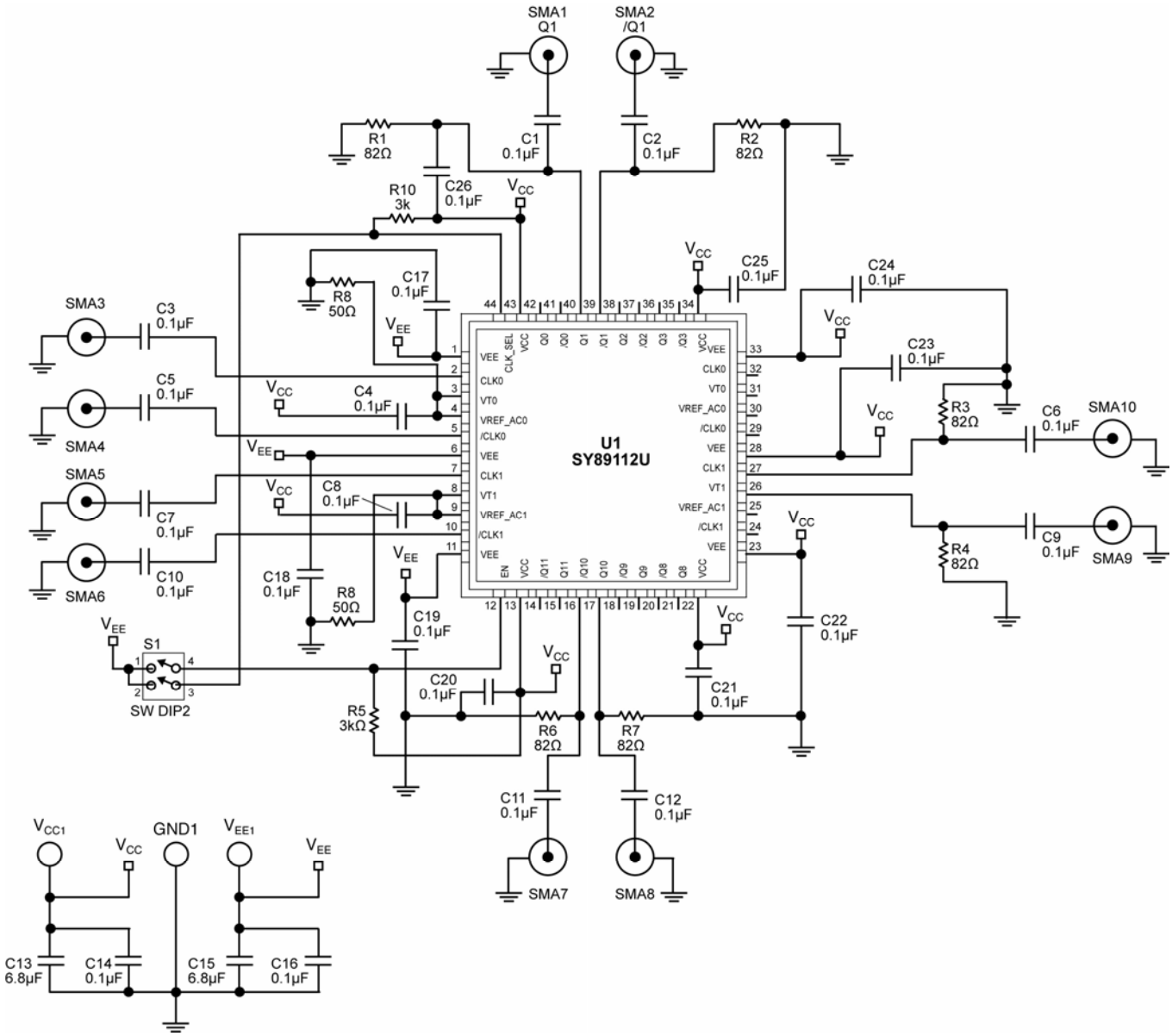
The AC-coupling capacitors are supplied on-board for each input, making it unnecessary to vary the offset voltage or change any components on the board as the power supply voltage varies. The user needs only to supply a minimum input voltage swing and the bias voltage will automatically adjust the input 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 +2.5V supply is split into a +2V and –0.5V, or for a +3.3V supply it is split into a +2V and –1.3V 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 -0.5V for 2.5V devices, or –1.3V for 3.3V devices so the device power pins still see a full 2.5V or 3.3V potential between V_{CC} and V_{EE}.

Step-by-step instructions for modifying an AC-coupled evaluation board for DC-coupled operation are listed in the "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	2.5V	+2.5V	0V	0V
AC-Coupled Input/AC-Coupled Output	3.3V	+3.3V	0V	0V

Table 1. AC-Coupled Evaluation Board Power Supply Connections

AC-Coupled Evaluation Board Setup

Setting up the SY89112U AC-Coupled Evaluation Board

The following steps describe the procedure for setting up the LVPECL-output evaluation board.

1. Set the voltage setting for a DC supply to be either 2.5V or 3.3V, depending on your application and turn off the supply.
2. On the evaluation board, short the GND terminal to the V_{EE} terminal and connect them to the negative side of the DC power supply.
3. Connect the V_{CC} terminal to the positive side of the DC power supply.
4. Turn on the power supply and verify that the power supply current is <200mA.
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 negative 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 SMA inputs on the evaluation board (SMA3-SMA6).
8. Using equal length 50Ω impedance coaxial cables, connect the SMA outputs of the evaluation board (SMA1, SMA2, SMA7, SMA8, SMA9, SMA10) to the oscilloscope or other measurement device that has an internal 50Ω termination.
9. Turn on the power and verify the current is <200mA.
10. Enable the signal source and monitor the outputs

Evaluation Board Layout

PC Board Layout

The evaluation board is constructed with Rogers 4003 material and is coplanar in design, 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 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 resistors 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 R1, R2, R3, R4, R6, and R7 from the outputs.
2. Remove capacitors C4 and C8 from input side.
3. Cut trace to pins 4 and 9, and leave VREF-AC0 and VREF-AC1 floating.
4. Replace capacitors C1, C2, C3, C5, C6, C7, C9, C10, C11, and C12 with 0Ω resistors.

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 (V_{CC}).
2. Set the voltage for DC supply number 2 to be –0.5V (for 2.5V operation) or –1.3V (for 3.3V operation) and connect it to (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 <200mA. Using a voltmeter.
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	+2.5V Supply
$V_{OH} = V_{CC}–1.0V$	+2.3V	+1.5V
$V_{OL} = V_{CC}–1.75V$	+1.55V	+0.75V

Table 3. Signal Source Output Levels

8. Using equal length 50Ω impedance coaxial cables, connect the outputs of the evaluation board (SMA1 and SMA2 or SMA7 and SMA8 or SMA9 and SMA10) to the oscilloscope or other measurement device that has an internal 50Ω termination. Any of these 6 outputs that are not connected to a scope or other instrument should be terminated with a 50Ω termination to ground at the SMA on the board.
9. Turn on the power and verify the current is <200mA.
10. Enable the signal source and monitor the outputs.

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12	VJ0402Y104KXXAT	Vishay(1)	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	12
C14, C16	VJ0603Y104KXXAT	Vishay(1)	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	2
C13, C15	293D685X0025CT	Vishay(1)	6.8µF, 20V, Tantalum Electrolytic Capacitor, Size C	2
R1, R2, R3, R4, R6, R7	CRCW040282R5F	Vishay(1)	82.5Ω, 1/16W, 1% Thick-film Resistor, Size 0402	6
R5, R10	CRCW04023001F	Vishay(1)	3kΩ, 1/16W, 1% Thick-film Resistor, Size 0402	2
R8, R9	CRCW040249R9F	Vishay(1)	49.9Ω, 1/16W, 1% Thick-film Resistor, Size 0402	2
SMA1 – SMA10	142-0701-851	Johnson Components(2)	82.5Ω, 1/16W, 1% Thick-film Resistor, Size 0402	10
SW1	CKN1362-ND	Digi-Key(3)	Low Profile Surface Mount, Half-pitch Dip Switch-2	1
TP1, TP2, TP3	5011K-ND	Digi-Key(3)	PC Test Point Multi-Purpose	3
U1	**SY89112U**	**Micrel(4)**	**2.5V/3.3V, 1:12 LVPECL Fanout Buffer with 2:1 Input MUX Internal 50Ω Input Termination**	1
PCB		Circuit Spectrum	SY89112U PCB	1

Additional Components for DC-Coupled Outputs

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C5, C6, C7, C9, C10, C11, C12	CRCW040200R0F	Vishay(1)	Replace with 0Ω, 1/16W, 1% Thick-film Resistor, Size 0402	10
R1, R2, R3, R4, R6, R7, R8, R9	CRCW040249R9F	Vishay(1)	49.9Ω, 1/16W, 1% Thick-film Resistor, Size 0402	8

Notes:

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

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 products 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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