Precision Low-Power Differential LVPECL 4:1 MUX with 1:2 Fanout and Internal Termination

SY89855U Evaluation Board

General Description

The SY89855U evaluation board is designed for convenient setup and quick evaluation of the SY89855U. It allows the user to evaluate the part over the full voltage-range without requiring any modifications to the board.

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

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

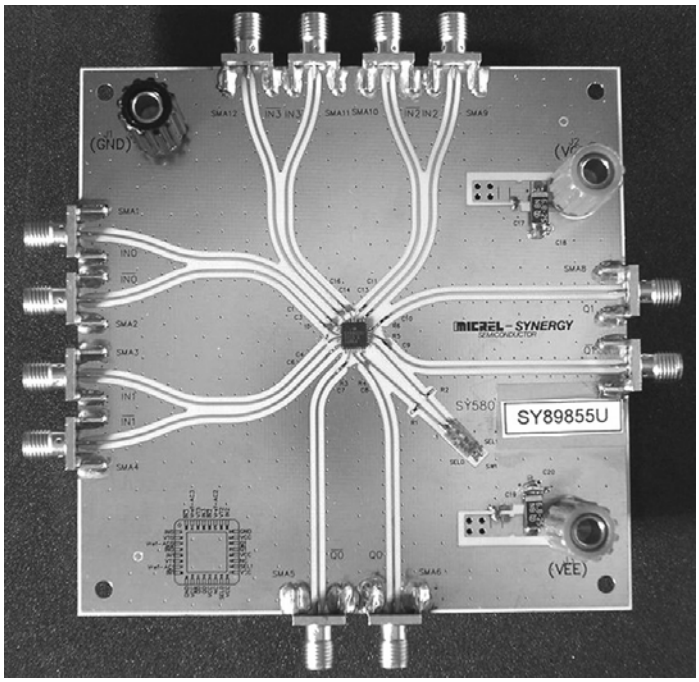
Features

- SY89855U 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 output operation

Related Documentation

- SY89855U Precision Low-Power Differential LVPECL 4:1 MUX with 1:2 Fanout and Internal Termination Data Sheet

Evaluation Board



Evaluation Board Description

The default configuration for the SY89855U evaluation board is AC-coupled inputs and AC-coupled outputs and all boards are shipped with this configuration. For applications that require DC-coupled outputs, the board can be easily modified. The choice between two configurations offers the user flexibility in selecting the board that is right for his particular application.

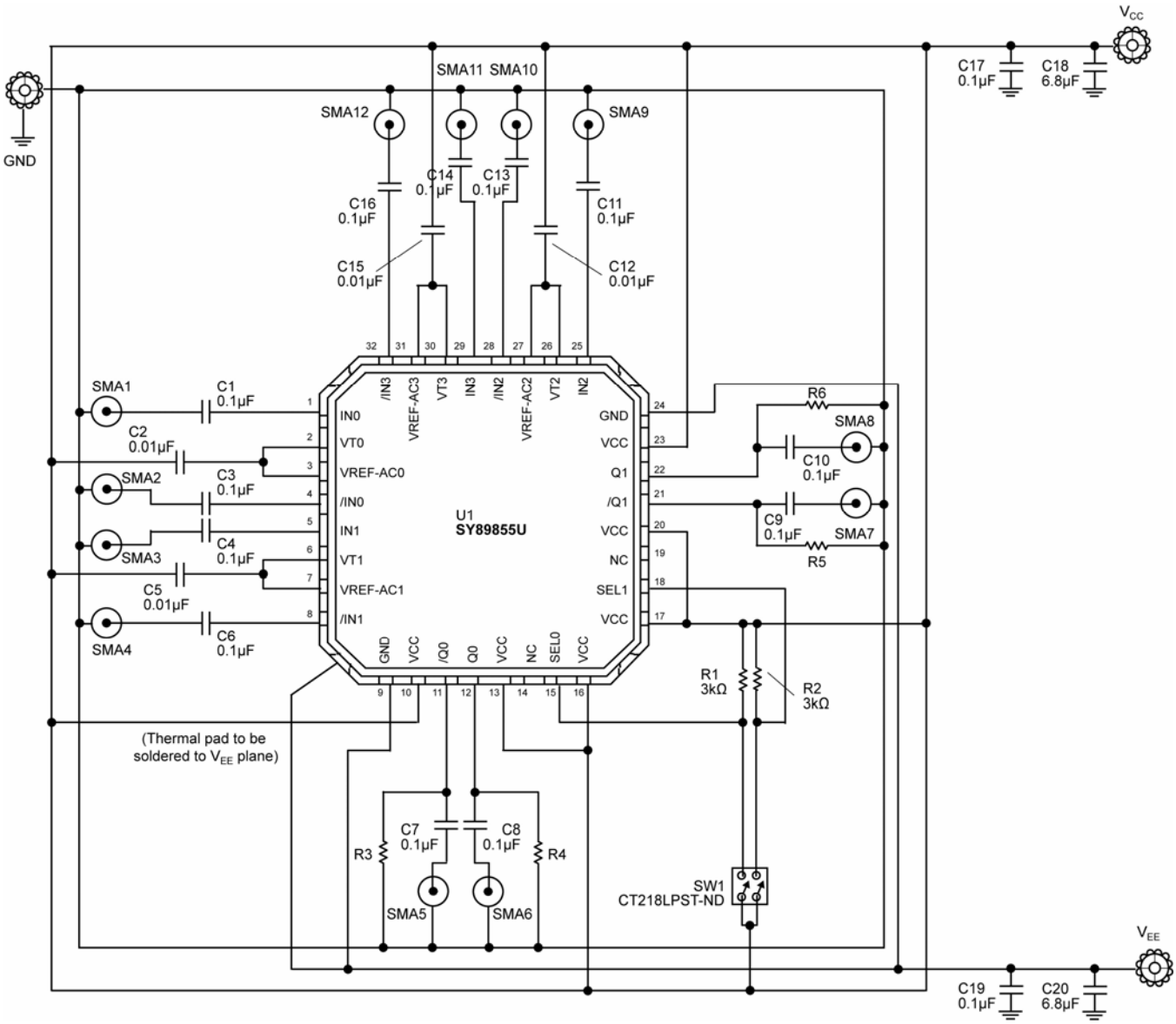
AC-Coupled Input

The evaluation board is shipped with input termination terminated to VCC-1.3V, allowing it to easily interface to any differential digital over the supply voltage range without modifying the evaluation board.

DC-Coupled Output

The DC-coupled output configuration can be used with standard 50Ω internally-terminated scopes. Since the scope is terminated with 50Ω-to-ground and standard PECL termination is 50Ω-to-V_{CC}-2V, the board can be used 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 +2.5V supply it is split into a +2V and –0.5V 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 –0.5V for 2.5V devices so the device power pins still see a full 3.3V or 2.5V potential between V_{CC} and V_{EE}.

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. SY89855U AC-Coupled Evaluation Board Power Supply Connection

hbwhelp@micrel.com or (408) 955-1690

Evaluation Board Setup

Setting up the SY89855U AC-Coupled Output 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 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 <300mA.
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 zero, 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 (SMA1 and SMA2 or SMA3 and SMA4 or SMA9 and SMA10 or SMA11 and SMA12).
8. Program the desired input using the dipswitch on the evaluation board.

SEL0	SEL1	Output
0	0	IN0
1	0	IN1
0	1	IN2
1	1	IN3

Table 2. Dipswitch Selection

9. Using equal length 50Ω impedance coaxial cables, connect the outputs of the evaluation board (SMA5 and SMA6 or SMA7 and SMA8) to the oscilloscope or other measurement device that has an internal 50Ω termination.
10. Terminate unused outputs with a 50Ω termination-to-ground.
11. Turn on the power and verify the current is <300mA.
12. Enable the signal source and monitor the outputs.

Evaluation Board Layout

PC Board Layout

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

Layer	Description
L1	GND & Signal
L2	GND
L3	V_{CC} & V_{EE}
L4	GND

Table 3. Layer Stack

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C3, C4, C6-C11, C13, C14, C16	VJ0402Y104KXXAT	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	12
C2, C5, C12, C15	VJ0402Y103KXXAT	Vishay[1]	0.01µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	4
C18, C20	293D685X0025B2T	Vishay[1]	6.8µF, 25V, Tantalum Electrolytic Capacitor, Size B	2
C17, C19	VJ0603Y103KXXAT	Vishay[1]	0.01µF, 25V, 10% Ceramic Capacitor, Size 0603, X7R Dielectric	2
R1, R2	CRCW04023001F	Vishay[1]	3kΩ, 1/16W, 5% Thick-film Resistor, Size 0603	2
R3-R6	CRCW040249R9Z CRCW0402101Z	Vishay[1]	49.9Ω, 1/16W, 5% Thick-film Resistor, Size 0402 (2.5V operation) 100Ω, 1/16W, 5% Thick-film Resistor, Size 0402 (3.3V operation)	4
J1	111-0703-001	Johnson Components[2]	Banana Post, Black	1
J2	111-0702-001	Johnson Components[2]	Banana Post, Red	1
J3	111-0704-001	Johnson Components[2]	Banana Post, Green	1
SMA1 – SMA12	142-0701-851	Johnson Components[2]	Jack Assembly End Launch SMA	12
SW1	CT2182LPST-ND	Digi-Key[3]	2-Position Dip switch	1
U1	**SY89855U**	**Micrel**[4]	**Precision Low-Power Differential LVPECL 4:1 MUX with 1:2 Fanout and Internal Termination**	1
PCB	SY58029-EVAL-00	Circuit Spectrum, Inc.	Printed Circuit Board	1

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.

When DC-Coupled outputs are needed

Reconfiguring an AC-Coupled output SY89855U Board into a DC-Coupled output Board

1. The following procedures details the steps for converting an AC-coupled output board to a DC-coupled output board:
2. Remove capacitors at C7 - C10 and replace with 0Ω resistors.
3. Remove resistors R3 - R6.

Setting up the SY89855U DC-Coupled Output 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 +2V and turn off the supply.
2. Connect the negative side of the DC supply to the GND terminal on the board.
3. Set the voltage setting for a second DC supply to be 0.5V for a 2.5V configuration (or 1.3V for a 3.3V configuration) and turn off the supply. Connect the V_{EE} terminal to the negative side of this second DC power supply and connect the positive side of this supply to the negative (GND) side of the first supply. This allows the SY89855U to see either +2.5V or +3.3V at V_{CC} with respect to V_{EE} while setting the GND to be 2V below V_{CC}. By doing this, the 50Ω termination-to-GND of the scope appears as a 50Ω termination-to-V_{CC}–2V for the device, which is the desired termination for an LVPECL output.
4. Turn on the power supply and verify that the power supply current is <300mA.
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 zero, 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 (SMA1 and SMA2 or SMA3 and SMA4 or SMA9 and SMA10 or SMA11 and SMA12)
8. Program the desired input using the dipswitch on the evaluation board.

SEL0	SEL1	Output
0	0	IN0
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Table 4. Dipswitch Selection

9. Using equal length 50Ω impedance coaxial cables, connect the outputs of the evaluation board (SMA5 and SMA6 or SMA7 and SMA8) to the oscilloscope or other measurement device that has an internal 50Ω termination.
10. Turn on the power and verify the current is <300mA.
11. Enable the signal source and monitor the outputs.

Additional Bill of Materials for SY89855U AC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C7-C10	CRCW0402000Z	Vishay (1)	Replace with 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402	4
R3-R6	CRCW040249R9Z CRCW0402101Z	Vishay(1)	49.9Ω, 1/16W, 5% Thick-film Resistor, Size 0402 (2.5V operation) 100Ω, 1/16W, 5% Thick-film Resistor, Size 0402 (3.3V operation)	4

Notes:

1. Vishay: www.vishay.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.

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 products 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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