



Precision Low-Power Dual 2:1 LVPECL MUX with Internal Termination

SY89853U Evaluation Board

General Description

The SY89853U evaluation board is designed for convenient setup and quick evaluation of the SY89853U. It allows the user to evaluate the part over the full voltage-range without requiring any modifications to the board.

The evaluation board standard configuration is AC-coupled for direct interface to a 50 Ω compatible oscilloscope without split supplies. For applications that require a DC-coupled 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.

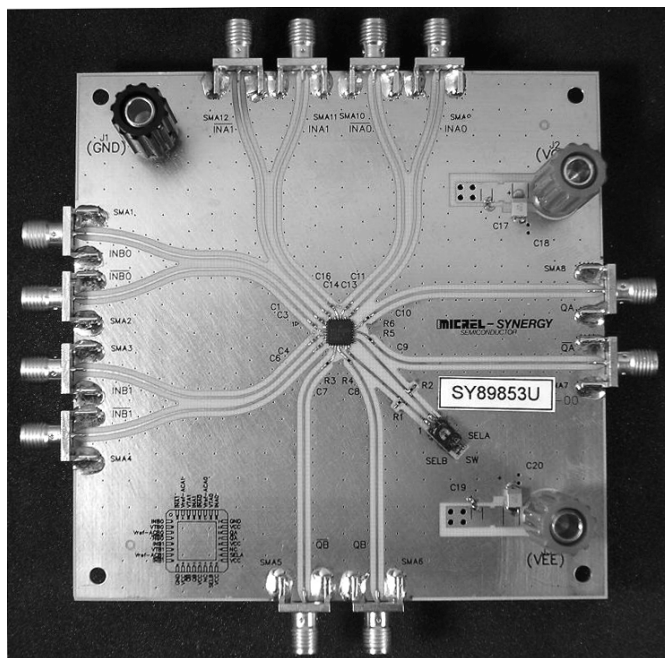
Features

- SY89853U 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

- SY89853U Precision Low-Power Dual 2:1 LVPECL MUX with Internal Termination Data Sheet

Evaluation Board



Evaluation Board Description

The default configuration for the SY89853U evaluation board is the AC-coupled configuration and all boards are shipped with this configuration. For applications that require DC-coupled outputs, the board can be easily modified. The choice between the two configurations offers the user flexibility in selecting the configuration that is right for the 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 $\pm 5\%$ or +3.3V $\pm 10\%$ and offers the most flexibility in interfacing to a variety of signal sources.

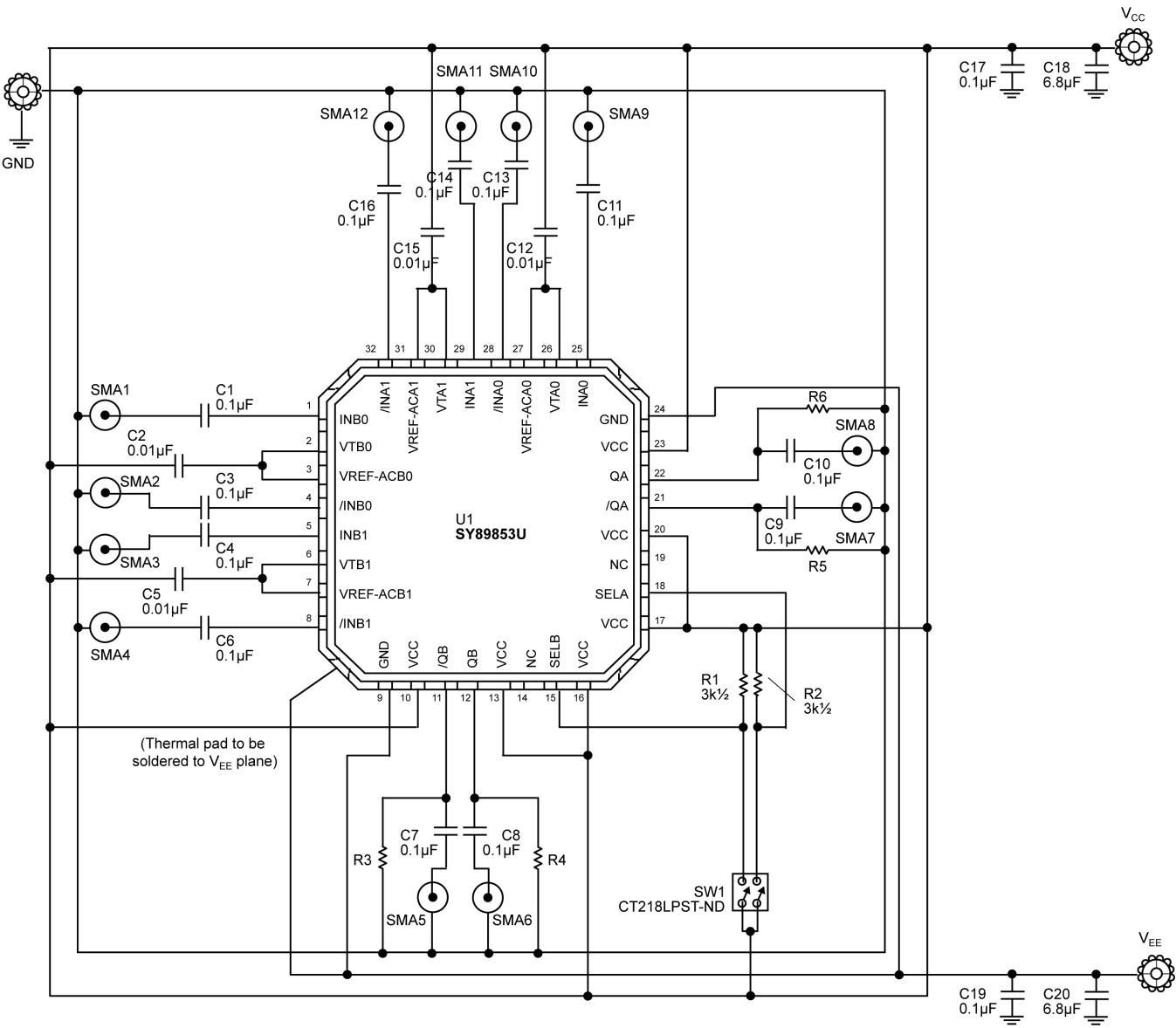
The AC-coupling capacitors are supplied on-board for each input, making it unnecessary to vary the offset voltage or change any components on the board as the power supply voltage varies. The user need only to supply a minimum input voltage swing and the bias voltage will automatically adjust the input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

DC-Coupled Output

For DC-coupled outputs, 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 +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 provides the correct terminations for the device by setting the GND 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} .

Step-by-step instructions for modifying an AC-coupled evaluation board for DC-coupled operation are supplied in the section: “Modifying your AC-Coupled Board for DC-Coupled Operation.”

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. SY89853U AC-Coupled Evaluation Board Power Supply Connection

AC-Coupled Evaluation Board Setup

Setting up the SY89853U AC-Coupled Evaluation Board

The following steps describe the procedure for setting up the LVPECL-output evaluation boards:

1. Set the voltage setting for a DC supply to 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 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 (SMA1 and SMA2 or SMA3 and SMA4 or SMA9 and SMA10 or SMA11 and SMA12).
8. Program the input select dipswitch to select the appropriate inputs according to the following tables:

SELA	QA
0	INA0
1	INA1

Table 2. Bank A Dipswitch Select

SELB	QB
0	INB0
1	INB1

Table 3. Bank B Dipswitch Select

9. Using equal length 50Ω impedance coaxial cables, connect the SMA outputs of the evaluation board (SMA5 and SMA6 or SMA7 and SMA8).
10. Turn on the power and verify the current is <300mA.
11. 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, fabricated to minimize noise, achieve high bandwidth and minimize crosstalk.

Layer	Description
L1	GND and Signal
L2	GND
L3	VCC and VEE
L4	GND

Table 4. Layer Stack

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1–C16, C17, C19	VJ0402Y104KXXAT	Vishay ⁽¹⁾	0.1μF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	18
C18, C20	293D685X0010	Vishay ⁽¹⁾	6.8μF, 20V, Tantalum Electrolytic Capacitor, Size B	2
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
PCB	SY58026-EVAL-00	Circuit Spectrum, Inc.	Printed Circuit Board	1
R1, R2	CRCW0603301F	Vishay ⁽¹⁾	3kΩ, 1/16W, 5% Thick-film Resistor, Size 0603	2
R3 – R6	CRCW0402820F	Vishay ⁽¹⁾	82Ω, 1/16W, 5% Thick-film Resistor, Size 0402	4
SMA1 – SMA12	142-0701-851	Johnson Components ⁽²⁾	Jack Assembly End Launch SMA	12
U1	SY89853U	Micrel⁽³⁾	Precision Low-Power Dual 2:1 LVPECL MUX with Internal Termination	1

Notes:

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

When DC-Coupling is Necessary

For applications where AC-coupling is not appropriate, the board can be reconfigured for DC-coupled output operation. This configuration allows the output to be connected directly to a scope with the standard termination of 50Ω to ground.

SY89853U

Reconfiguring an AC-Coupled SY89853U Board into a DC-Coupled Board

The following procedures detail the steps for converting an AC-coupled output board to a DC-coupled output board:

1. Remove output load resistors R3-R6.
2. Replace capacitors C7–C10 with 0Ω resistors.

Setting up the SY89853U DC-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 +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 SY89853U 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 SMA inputs on the evaluation board (SMA1 and SMA2 or SMA3 and SMA4 or SMA9 and SMA10 or SMA11 and SMA12).
8. Program the input select dipswitch to select the appropriate inputs according to the following tables:

SELA	QA
0	INA0
1	INA1

Table 5. Bank A Dipswitch Select

SELB	QB
0	INB0
1	INB1

Table 6. Bank B Dipswitch Select

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 SY89853U DC-Coupled Evaluation Board

Item	Part Number	Manufacturer	Description	Qty.
C7–C10	CRCW040200R0F	Vishay ⁽¹⁾	Replace with 0Ω, 1/16W, 5% Thick-film Resistor, Size 0402, X7R Dielectric	10

Note:

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 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 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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