



19MHz to 622MHz Precision Synthesizer with CML Output and Internal Termination

SY89610L Evaluation Board

General Description

The SY89610L evaluation board is designed for convenient setup and quick evaluation with SMA connectors on each I/O. The board is optimized to interface directly to a 50Ω oscilloscope.

The board is designed in multiple layers for better performance and simple signal evaluation. For best AC performance, the board is configured in AC-coupled In and AC-coupled Out configuration.

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

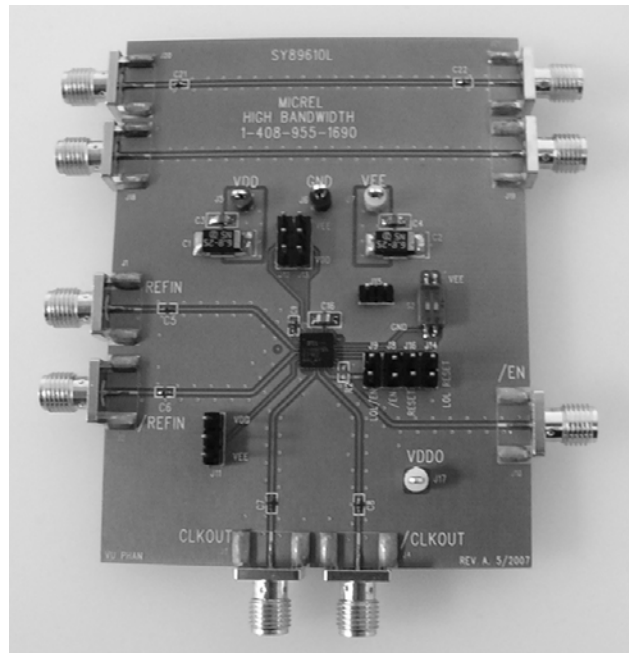
Features

- SY89610L CML output
- +3.3V power supply
- AC-coupled configuration for ease-of-use
- I/O interface includes on-board termination
- Fully assembled and tested

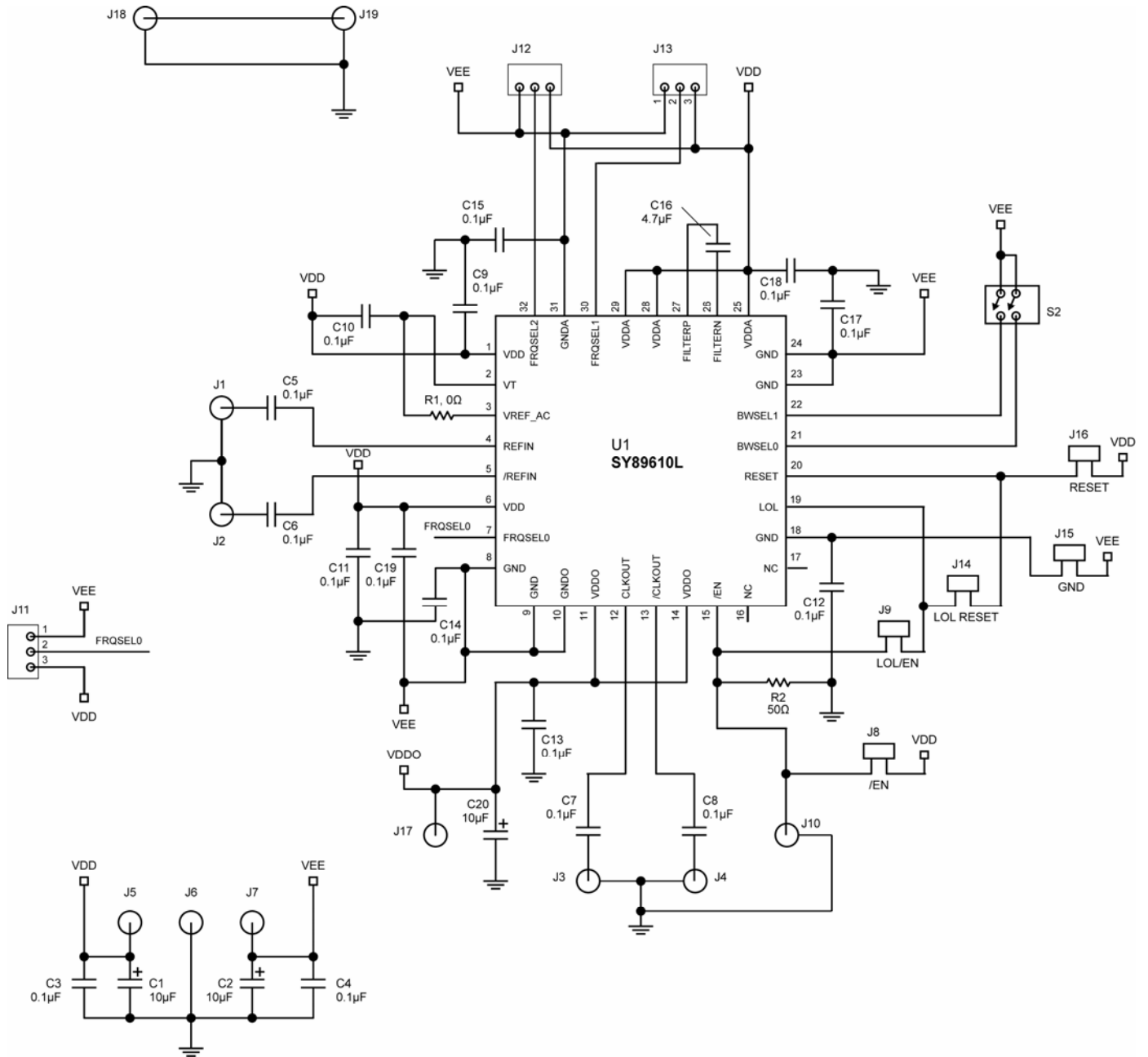
Related Documentation

- SY89610L, 19MHz-622MHz Precision Synthesizer with CML Output and Internal Termination Datasheet

Evaluation Board



Evaluation Board Schematic



I/O	V _{DD} , V _{DDO}	GND	V _{EE}
SY89610 AC-Coupled Input/Output	3.3V	0V	0V

Table 1. Evaluation Board Power Supply Connection

Evaluation Board Description

The SY89610L CML-output evaluation board operates on a nominal 3.3V supply.

The default configuration for the board is the AC-coupled configuration. The choice between AC- or DC-coupled configurations offers the user flexibility for different applications.

AC-Coupled Evaluation Board

The AC-coupled configuration is suited for most customer applications and is preferred by the majority of users because of its ease-of-use. It requires only a single power supply and offers the most flexibility when interfacing to a variety of signal sources.

DC-Coupled Evaluation Board

To allow the CML output to be used in a DC-coupled configuration with a scope that has a standard 50Ω-to-GND termination and an operating voltage of 3.3V, the V_{DD} , V_{DDO} , and GND of the board are set to 0V and the V_{EE} is set to -3.3V. This allows the body of the SMA connectors, which are scope GND, to appear at the same potential as V_{DD} for the CML output driver.

AC-Coupled Evaluation Board Setup

Setting up the SY89610L 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 3.3V 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_{DD} and V_{DD0} terminal to the positive side of the DC power supply.
4. Turn on the power supply and verify the power supply current is <250mA.
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). Turn off or disable the outputs of the signal source.
7. Using equal length 50Ω impedance coaxial cables, connect the signal source to the REFIN input on the evaluation board.
8. Using equal length 50Ω impedance coaxial cables, connect the CLKOUT output of the evaluation board to the oscilloscope or other measurement device that has an internal 50Ω termination.
9. If SMA10, SMA18, or SMA19 are on the board, ignore them. Make sure R2 is left open.
10. For normal operation, open jumpers J8, J9, J14, and J16. Short jumper J15.

When the PLL does not have an acceptable phase lock and thus, an unacceptable output at CLKOUT, the output can be disabled and reset automatically. To accomplish this, short the jumpers J9, J14, and J15. Open jumpers J8 and J16.

11. To apply an external input to /EN, use SMA10. Open jumper J9 and provide R2.
12. Select the desired loop bandwidth through the S2 switch, which contains the BW0 and BW1 selects. Refer to Table 2 below.

BW1	BW0	Loop Bandwidth (Hz)
0	0	1K
0	1	2K
1	0	5K
1	1	10K

Table 2. Loop Bandwidth Select

13. Select the desired output frequency through J11, J13 and J12. Each represent frequency selects Frqsel0, Frqsel1, and Frqsel2, respectively. Refer to table 3 below.

J12	J13	J11	Input Frequency	Output Frequency
0	0	0	78MHz	78MHz
0	0	Float	78MHz	155MHz
0	0	1	78MHz	311MHz
0	Float	0	78MHz	622MHz
0	Float	1	155MHz	155MHz
0	1	0	155MHz	311MHz
0	1	Float	155MHz	622MHz
Float	0	1	311MHz	311MHz
Float	Float	0	311MHz	622MHz
Float	1	Float	622MHz	622MHz
1	0	0	19MHz	78MHz
1	0	Float	19MHz	155MHz
1	0	1	19MHz	311MHz
1	Float	0	19MHz	622MHz

Table 3. Frequency Select

14. Turn on the power and verify the current is <500mA.
15. Enable the signal source and monitor the outputs.

Modifying an AC-Coupled Board for DC-Coupling Operation

When DC-Coupling the Output is Necessary

For applications where AC-Coupling the output is not appropriate, the board can be reconfigured for DC-Coupled output operation. The inputs remain AC-Coupled.

Perform the following procedure in order to convert an AC-coupled board to a DC-Coupled board:

1. Replace capacitors C7 and C8 with 0 Ω resistors.

DC-Coupled Evaluation Board Setup

The following steps describe the procedure for setting up the DC-Coupled evaluation board:

1. Set the voltage setting for a DC supply to be 3.3V and turn off the supply.
2. On the board, short GND, V_{DD}, and V_{DDO}.
3. Connect the positive side of the power supply to V_{DD}. The board ground is now at V_{DD}.
4. Connect the negative side of the power supply to V_{EE}.
5. Verify that the power supply current is <420mA.
6. Turn off the power supply.
7. Using a differential signal source, set the amplitude of each side of the differential pair to be 800mV (1600mV measured differentially). The 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.
8. Using equal length 50 Ω impedance coaxial cables, connect the signal source to the REFIN input on the evaluation board.
9. Using equal length 50 Ω impedance coaxial cables, connect the CLKOUT output of the evaluation board to the oscilloscope or other measurement device that has an internal 50 Ω termination.
10. Follow steps 9-14 located in the "AC-Coupled Evaluation Board Setup" section on page 4.
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 to minimize noise, achieve high bandwidth, and minimize crosstalk. I/O strips signal traces are micro-strip.

Top	Signal
L2	GND
L3	VDD
L4	VEE
L5	GND
Bottom	Signal and GND

Table 4. Layer Stack

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1,C2, C20	293D106X06R3A	Vishay ⁽¹⁾	10 μ F, 20V, Tantalum Electrolytic Capacitor, Size C	3
C3-C15, C17-C19,	VJ0402Y104KXXAT	Vishay ⁽¹⁾	0.1 μ F, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	16
R1	CRCW04020000Z	Vishay ⁽¹⁾	0 Ω , 1/16W, Resistor SMD, Size 0402	1
R2	CRCW04020500F	Vishay ⁽¹⁾	50 Ω , 1%, Resistor, Size 0402	1
J1	5005K-ND	Keystone ⁽²⁾	Red Test Point PC Compact, .063" D	1
J2	5006K-ND	Keystone ⁽²⁾	Black Test Point PC Compact, .063" D	1
J3	5009K-ND	Keystone ⁽²⁾	Yellow Test Point PC Compact, .063" D	1
SMA1-SMA4, SMA10, SMA18-SMA19	142-0701-851	Johnson ⁽³⁾	Jack Assembly End Launch SMA	6
J8-J9, J14-J16	PZC36SFBN	Digi-Key ⁽⁴⁾	2-pin header	5
J11-J13	PZC36SFBN	Digi-Key ⁽⁴⁾	3-pin header	3
S2	CKN1362-ND	Digi-Key ⁽⁴⁾	Dip Switch	1
U1	SY89610L	Micrel⁽⁵⁾	19MHz-622 MHz Precision Synthesizer	1

Notes:

1. Vishay: www.vishay.com.
2. Keystone Electronics: www.keyelco.com.
3. Johnson Components: www.johnsoncomponents.com.
4. Digi-Key: www.digikey.com
5. 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 either "Application Hints" or Application Notes".

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