DC-to-6.4Gbps Backplane Receive Buffer with Four Stage Programmable Equalization and DC-Offset Control

SY58627L Evaluation Board

General Description

The SY58627L evaluation board is designed for convenient setup and quick evaluation of the SY58627L backplane transmit buffer. The board is optimized to interface directly to a 50Ω oscilloscope.

For best evaluation of the features of this part, the board is configured in DC-coupled In and DC-coupled Out configuration. For applications that require an AC-coupled configuration, step-by-step instructions for modifying the board are included.

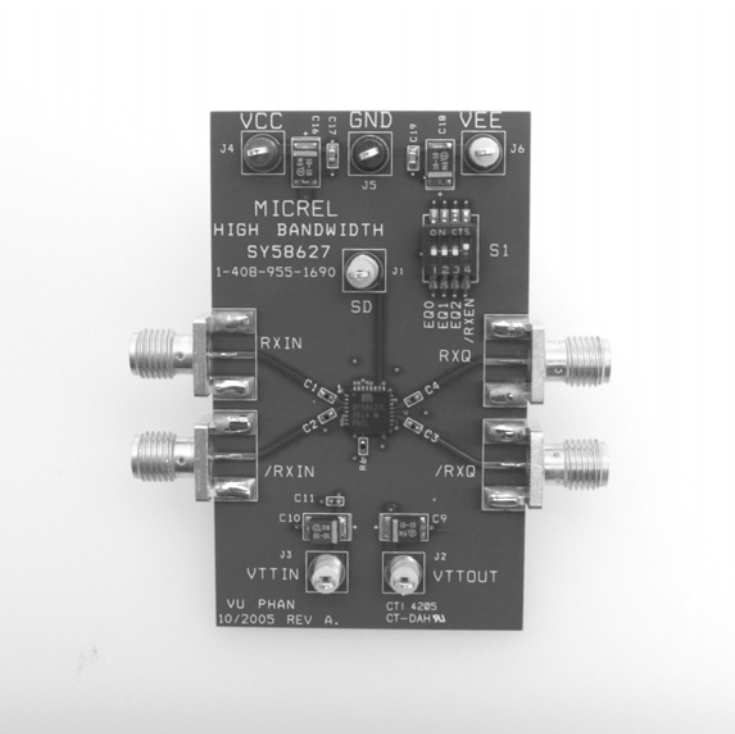
Features

- +3.3V power supply for the SY58627L
- DC-coupled configuration
- I/O interface includes on-board termination
- Fully assembled and tested
- Can be reconfigured for AC-coupled operation

Related Documentation

- SY58627L DC-to-6.4Gbps Backplane Receive Buffer with Four Stage Programmable Equalization and DC-Offset Control

Evaluation Board



Evaluation Board Description

The default configuration for the SY58627L board is DC-coupled. The choice between AC-coupled and DC-coupled configurations offers the user flexibility for specific applications.

DC-Coupled Evaluation Board

The SY58627L default configuration is set up for DC-coupled operation. In the DC-coupled configuration, the input and output voltage offset can be easily adjusted to interface directly with a variety of logic levels. Adjustable VCC, VEE, VTTIN, and VTTOUT in addition to the wide input voltage range (100mV to $1.3V_{PK}$) provide maximum I/O versatility.

Determining the output voltage offset, while interfacing the SY58627L evaluation board to a 50Ω-to-GND scope, can be accomplished using the following calculations:

1. The VOH output is set by the voltage divider between the 50Ω to VTTOUT resistor (internal) and the 50Ω-to-GND resistor (scope). Therefore, the VOH level of the output is the center voltage between VTTOUT and GND.
2. The VOL output level will typically be 400mV below the VOH output level.

For quick evaluation of the SY58626L, connect V_{CC}, VTTIN, VTTOUT, and GND to 0V and V_{EE} to -3.3V. This sets VTTOUT and the scope ground to the same potential, setting the VOH level at approximately 0V.

AC-Coupled Evaluation Board

The SY58627L evaluation board can be reconfigured for AC-coupled operation. AC-coupled configuration requires only a single power supply and easily interfaces to a 50Ω-to-GND scope.

After the SY58626L board is reconfigured for AC-coupled operation, the unique internal input termination sets the input common mode voltage. This enables the input to interface with any differential signal over the supply voltage without modifying the board.

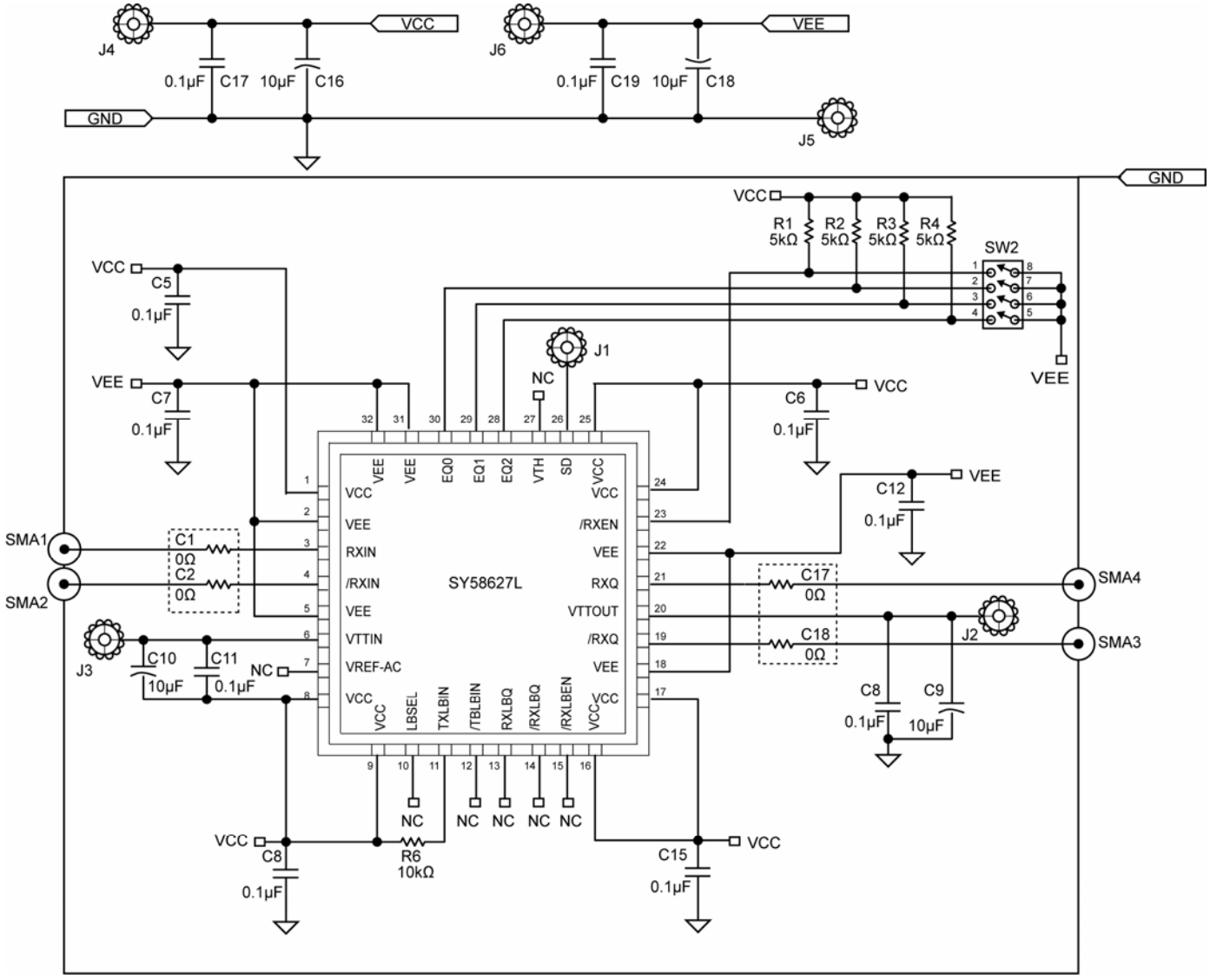
Transmitter Variable-Swing Output

The SY58627L RXIN input pair provides a Signal Detect (SD) output. The SD output asserts HIGH when the swing across the RXIN input pair is greater than $110mV_{PK}$ ($220mV_{PP}$). SD output de-asserts LOW when the swing across the RXIN input pair is less than $90mV_{PK}$ ($180mV_{PP}$). Hysteresis is included in the SD output to prevent oscillation when no signal is present at the RXIN input.

Output Disable

The SY58627L provides a disable output function. When /RXEN is pulled HIGH, the output buffer is disabled. TXQ output switches to a HIGH state and /TXQ output switches to a LOW state.

Evaluation Board

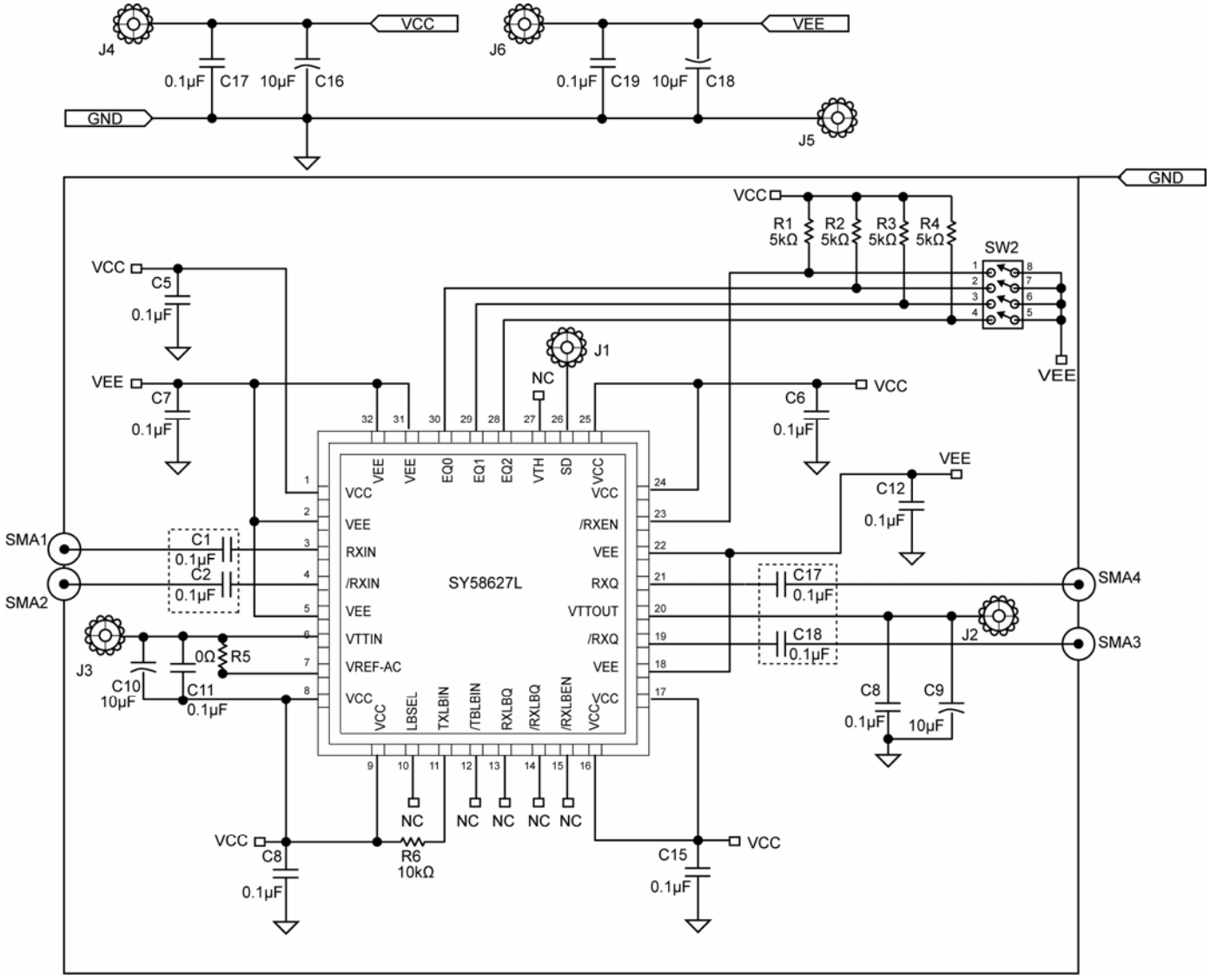


SY58626L DC-Coupled Evaluation Board

I/O	Power Supply	V_{CC}	GND	V_{EE}
DC-Coupled Input/DC-Coupled Output	3.3V	0V	0V	-3.3V

Table 1. Quick Start SY58626L DC-Coupled Evaluation Board Power Supply Connections

Evaluation Board



SY58626L AC-Coupled Evaluation Board

I/O	Power Supply	V_{CC}	GND	V_{EE}
AC-Coupled Input/AC-Coupled Output	3.3V	+3.3V	0V	0V

Table 2. SY58626L AC-Coupled Evaluation Board Power Supply Connections

DC-Coupled Evaluation Board Setup

Setting up the SY58627L DC-Coupled Evaluation Board

The following steps describe the quick start 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. Connect the V_{CC}, VTTIN, VTTOUT, and GND terminals to the positive side of a DC power supply. This sets the 0V GND potential.
3. Connect the V_{EE} terminal to the negative side of a 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. Disable the outputs of the differential signal source and set the V_{OH} = V_{CC}-0.2V and the V_{OL} = V_{CC}-0.6V.
7. Using equal length 50Ω impedance coaxial cables, connect the outputs of the signal source to the inputs of the evaluation board (SMA1 and SMA2)
8. Using equal length 50Ω impedance coaxial cables, connect the outputs of the evaluation board (SMA4 and SMA3) to the oscilloscope or other measurement device that has an internal 50Ω termination. Any of these 2 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 <400mA.
10. Enable the signal source and monitor the outputs.

Modifying DC-Coupled Boards for AC-Coupled Operation

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

The following procedure details the steps for converting a DC-coupled board to an AC-coupled board:

1. Remove resistor R5
2. Replace resistors on C1, C2, C3, and C4 with 0.1µF capacitors.

Setting up the AC-Coupled Evaluation Board

The following steps describe the procedure for setting up the AC-coupled evaluation board:

1. Set the voltage setting for a DC supply to be 3.3V and turn off the supply.
2. Connect the GND and V_{EE} 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 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 400mV (800mV measured differentially). 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 equal length 50Ω impedance coaxial cables, connect the signal source to the inputs on the evaluation board (SMA1 and SMA2).
8. Using equal length 50Ω impedance coaxial cables, connect the outputs of the evaluation board (SMA4 and SMA3) to the oscilloscope or other measurement device that has an internal 50Ω termination. Any of these 2 outputs that are not connected to a scope or other instrument should be terminated with a 50Ω to ground at the SMA on the board.
9. Turn on the power supply and verify the current is <400mA.
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	GND and Signal
L2	GND
L3	VCC
L4	VEE
L5	Signal
L6	GND and Signal

Table 3. Layer Stack

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C5-C8, C11-C15, C17, C19	VJ0402Y100KXXA	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	11
C9, C10, C16, C18	293D106X0010B2T	Vishay[1]	10µF, 10V, Tantalum Electrolytic Capacitor, Size B	4
C1-C4	CRCW04020R00F	Vishay[1]	0Ω, 1/16W, Resistor SMD, Size 0402	4
R1-R4	CRCW04025111F	Vishay[1]	5kΩ, 1/10W, 5% Thick-film Resistor, Size 0402	4
R6	CRCW04021002F	Vishay[1]	10kΩ, 1/10W, 5% Thick-film Resistor, Size 0402	1
SMA1-SMA4	142-0701-851	Johnson[4]	Jack Assembly End Launch SMA	4
J4	5005K-ND	Digi-Key[5]	Color Coded PCB Test Point - Red	1
J5	5006K-ND	Digi-Key[5]	Color Coded PCB Test Point - Black	1
J1-J3, J6	5009K-ND	Digi-Key[5]	Color Coded PCB Test Point - Yellow	4
SW1	CKN1363-ND	Digi-Key[5]	4-Position Dip Switch	1
U1	**SY58627L**	**Micrel[5]**	DC-to-6.4Gbps Backplane Receive Buffer with Four Stage Programmable Equalization and DC-Offset Control	1

Additional Components for AC-Coupled Boards

Item	Part Number	Manufacturer	Description	Qty.
C1-C4	VJ0402Y100KXXA	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X7R Dielectric	4
R5	CRCW04020R00F	Vishay[1]	0Ω, 1/16W, Resistor SMD, Size 0402	1

Notes:

1. Vishay: www.vishay.com.
2. Bourns: www.bourns.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 "Application Hints and Application Notes."

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