SY88149HL Evaulation Board

3.3V 1.25Gbps Burst-Mode Limiting Amplifier with Ultra-Fast Signal Assert Timing

General Description

The SY88149HL evaluation board enables fast and thorough evaluation of the SY88149HL. The board is an easy-to-use and is designed to be driven by a high-speed pattern generator.

The SY88149HL evaluation board is intended to terminate to a 50Ω scope. It provides multiple configurability options to fully evaluate the high performance SY88149HL. SD/LOS threshold can be adjustment through an on-board potentiometer.

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

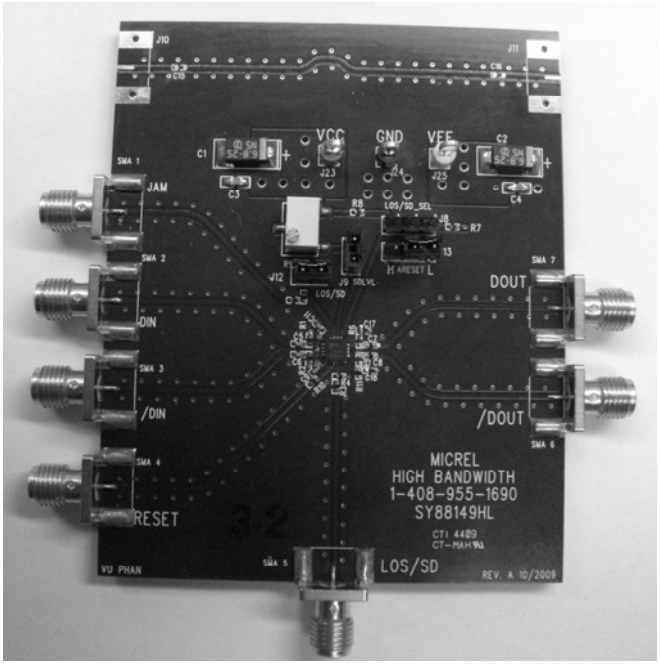
Features

- SY88149HL burst-mode limiting post amplifier with ultra-fast signal assert timing
- Two power supply options: single 3.3V or split ground
- On-board LOS/SD sensitivity adjustment
- Manual and Automatic RESET option

Related Documentation

- SY88149HL Datasheet

Evaluation Board



Evaluation Board Description

The SY88149HL evaluation board is designed to operate with a single 3.3V ±10% power supply or a split ground option (Vcc at +2.0V and Vee at -1.3V). See Table 1 for board configurability options.

AC-Coupled Input

The AC-Coupled inputs and 50Ohm termination on the input traces automatically bias the input levels to the correct DC-operating point set by the V_{REF} pin. Therefore, the inputs can be driven by a differential signal smaller than 10mV ($20mV_{PP}$) without level-shifting or termination resistor network in the signal path.

AC-Coupled/DC-Coupled Output

The SY88149HL can be configured with AC or DC-coupled outputs by changing the termination network on the output traces. This allows the board to interface directly with 50Ω equipment. Please see Table 1 for exact configuration. Adding output termination and AC-coupling allows the board to use a single power supply. If the board is DC-coupled, a split ground power option would have to be used. If only one output is being used, then the unused complimentary output should be terminated into 50Ω to ground.

Evaluation Board Layout

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

L1	GND and Signal
L2	GND
L3	VCC
L4	VEE
L5	GND
L6	Signal and GND

Table 2. Layer Stack

Evaluation Board Setup

This section explains how to connect and setup the SY88149HL board to fully evaluate the part. Table 1 below provides the configuration information based on the designed evaluation method. By default, the evaluation board is shipped with the split ground option. Ensure proper ESD precautionary measures are taken before handling sensitive electronic equipment, including the SY88149HL evaluation board.

Configuration Option	Board Modification
Split Ground (Vcc +2.0V, GND 0V, Vee -1.3V)	• Ensure R5, R6, R11, C17, C18 are not installed • C7, C8 are replaced by 0Ω resistors • Attach Vcc to J23, GND to J24 and Vee to J25
Single Ground (Vcc +3.3V, GND 0V, Vee 0V)	• Install R5, R6, R11, C7, C8, C17, C18 according to schematic • Attach Vcc to J23 and Vee to J24, J25
Drive JAM input with external pulse generator	• Remove jumper at J12 • Ensure R13 is installed • Connect external source to SMA1
Adjust LOS/SD Sensitivity Level	• Lift jumper at J9 • Place ohmmeter between J9-Pin1 and Vcc and adjust R9 to desired value • Place jumper back onto J9
Apply Manual Reset signal	• Ensure R10 is installed • Connect external source to SMA4
Switch between LOS/SD modes	• Ensure R7 and R8 are installed. • Move jumper between J8-Pin1 and J8-Pin3

Table 1. Evaluation Options

Product Evaluation

Evaluating DOUT and /DOUT

1. Set a DC power supply either +2.0V and -1.3V or single +3.3V and turn it off. Connect the positive and negative leads to the board according to the configuration option chosen.
2. Set the desired frequency on a pattern generator with amplitude between 10mV$_{PP}$ and 1800mV$_{PP}$. Typical data patterns are 2^7-1 or 2^{23}-1 PRBS patterns, depending upon the application. Since the inputs to the board are AC-Coupled, the voltage offset of the pattern generator is not significant so it can be set between GND and V_{CC}.
3. Connect the pattern generator with differential outputs as a data source to the DIN and /DIN inputs on the SY88149HL evaluation board. Use matched- length differential cables.
4. Turn the power supply on. Icc should be lower than 80mA.
5. Observe the DOUT and /DOUT outputs with a 50Ω scope.

Evaluating RESET functions

1. Follow the above steps to set up the board for evaluation.
2. If no Manual Reset is applied and Auto Reset is tied low (J13), SD will deassert (or LOS will assert) 100nS after the last input High level.
3. If Manual Reset is present, SD will remain deasserted (or LOS will remain asserted) regardless of input signal amplitude and Auto Reset state.
4. If neither Manual Reset nor Auto Reset is applied, then the SD will remain asserted (or LOS will remain deasserted) as though signal were still present at the input.
5. Manual Reset, as well as JAM, are external LVTTL signals and should have the appropriate amplitude as indicated in the datasheet.

LOS/SD Hysteresis Measurements

The SY88149HL evaluation board provides a potentiometer to allow for convenient adjustment of LOS/SD$_{LVL}$ without the need for an extra power supply. LOS/SD$_{LVL}$ taps off a potentiometer connected between V_{CC} and V_{REF}. V_{REF} is a reference voltage of approximately V_{CC} -1.3V. Hence, LOS/SD$_{LVL}$ can be set to any voltage between V_{CC} and V_{CC}-1.3, as specified in the SY88149HL data sheet. The potentiometer creates a voltage divider. Thus,

$$LOS/SD_{LVL} = \left[V_{CC} - \frac{1.3 \times R\,(k\Omega)}{(R(k\Omega) + 2.8k\Omega)} \right]$$

Where: R is the resistance of the potentiometer R9 from V_{CC} to the tap at LOS/SDLVL. The steps below show how to measure the LOS/SD hysteresis as a function of the input voltage swing at the DIN and /DIN inputs:

Minimum Input Swing Hysteresis Measurement

The optimal input signal range to trigger the LOS assert (or SD de-assert) function is between 3mVpp and 20mVpp depending upon the value of R9. For more information, please refer to the SY88149HL Datasheet.

To properly evaluate the full operation of the SD/LOS, it is recommended that /AutoReset be set to the low state (J13-Pin3)

1. Set a DC power supply as described in the previous section.
2. Connect the LOS/SD output (SMA5) to the scope.
3. Connect the pattern generator with differential outputs as a data source to the DIN and /DIN inputs on the SY88149HL evaluation board. Use matched- length differential cables.
4. Turn the power supply on.
5. Increase the trimpot R9 resistance so the voltage at the LOS$_{LVL}$ pin is around 1.3V below V_{CC}. This sets the LOS for maximum sensitivity. At this level, the LOS/SD output should switch as the input voltage swing at DIN and /DIN is varied around 3mV$_{PP}$. The input voltage at which the LOS output goes HIGH or LOW is the LOS assert voltage or LOS de-assert voltage, respectively (and vice versa if SD is selected)
6. Now decrease R9 resistance. Note that as the voltage at the LOS$_{LVL}$ pin approaches V_{CC}, a larger input voltage swing is required to trigger assert and de-assert levels. See datasheet for more details.
7. The LOS hysteresis between assert and de-assert levels can be calculated with the following equation:

   Hysteresis (dB) = 20 * log($V_{Deassert}$/V_{Assert})
8. If SD is selected, hysteresis can be calculated by: Hysteresis (dB) = 20 * log(V_{Assert}/$V_{Deassert}$).

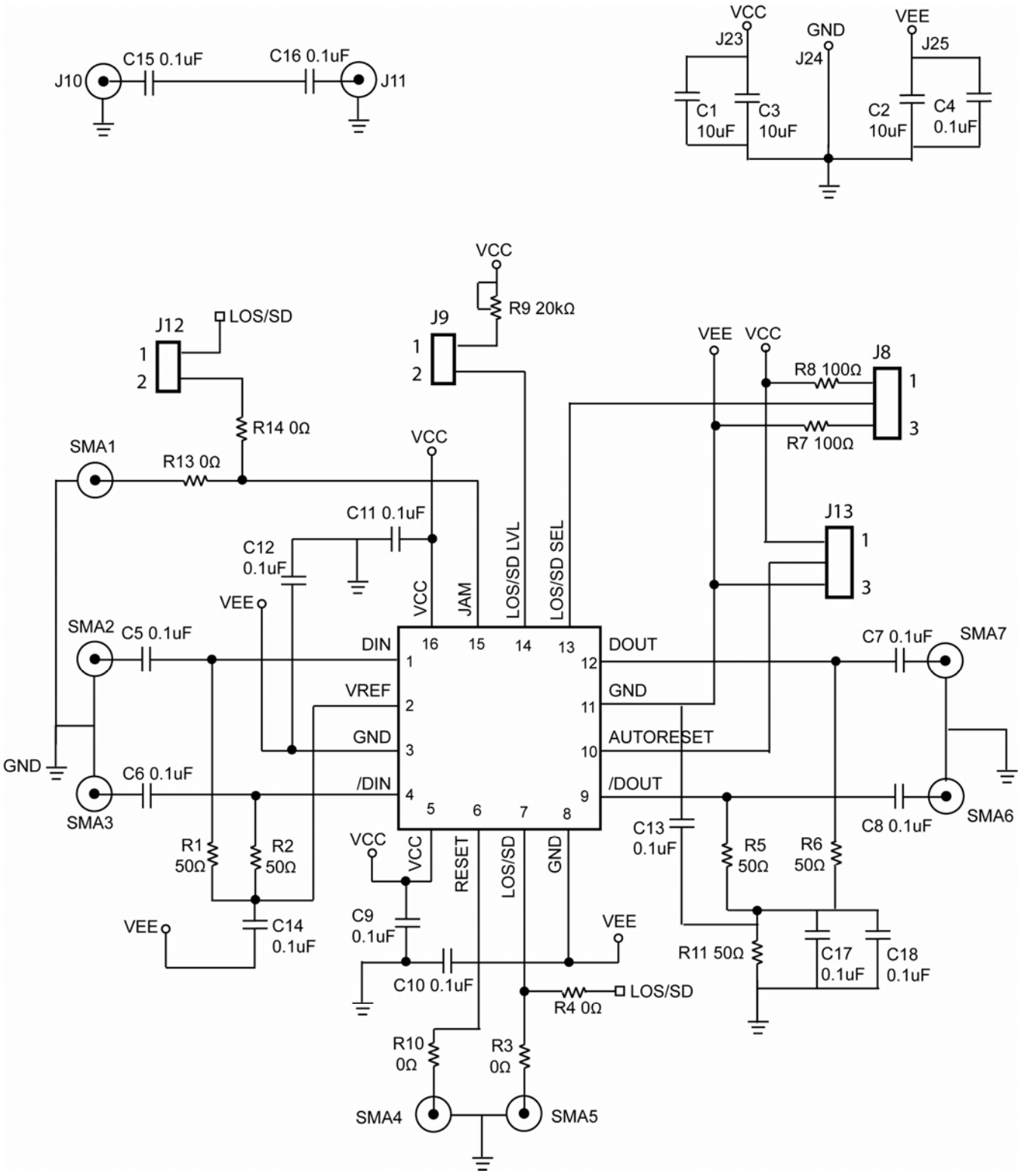


Figure 1. Evaluation Board Schematic

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C5 – C18	VJ0402Y104KXXAT	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X5R, Dielectric	14
C3, C4	VJ0603Y104KXXAT	Vishay[1]	0.1µF, 25V, 10% Ceramic Capacitor, Size 0603, X5R, Dielectric	2
C1, C2	293D106X0025CT	Vishay[1]	10µF, Surface Mount Capacitor, Size C	2
JP8, J9, J12, J13	TSW-103-07-S-S	Samtec[3]	0.1mil Center through hole terminal strip	4
R1, R2	CRCW040249R9F	Vishay[1]	50Ω, 10%, 1/16W Resistor SMD, Size 0402	2
R5, R6, R11	CRCW040230E0F	Vishay[1]	300Ω, 10%, 1/16W Resistor SMD, Size 0402	3
R3, R4, R10, R13, R14	CRCW040200R0F	Vishay[1]	0Ω, 10%, 1/16W Resistor SMD, Size 0402	5
R7, R8	CRCW040299R9F	Vishay[1]	100Ω, 10%, 1/16W Resistor SMD, Size 0402	2
R9	3269W-1-153G	Bourns[4]	20kΩ Trimpot	1
J1–J7	142-0701-851	Johnson Components[5]	Jack Assembly End Launch SMA	7
U1	**SY88149HL**	**Micrel, Inc.[7]**	**Post Amplifier**	**1**

Notes:

1. VIshay: www.vishay.com.
2. Samtec: www.samtec.com.
3. Bourns: www.bourns.com.
4. Johnson Components: www.johnsoncomponents.com.
5. **Micrel, Inc.: www.micrel.com.**

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