



SY88303BL Evaluation Board

**3.3V, 3.2Gbps CML Limiting Post Amplifier
with Wider Loss-of-Signal Detection Range**

General Description

The SY88303BL evaluation board enables fast and thorough evaluation of the SY88303BL CML Limiting Post Amplifier. The board is an easy-to-use, single supply design, designed to be driven by a high-speed, pattern generator.

The SY88303BL evaluation board is intended to terminate to a 50Ω scope and provides for simple user adjustability of the LOS threshold through the adjustment of an on-board potentiometer.

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

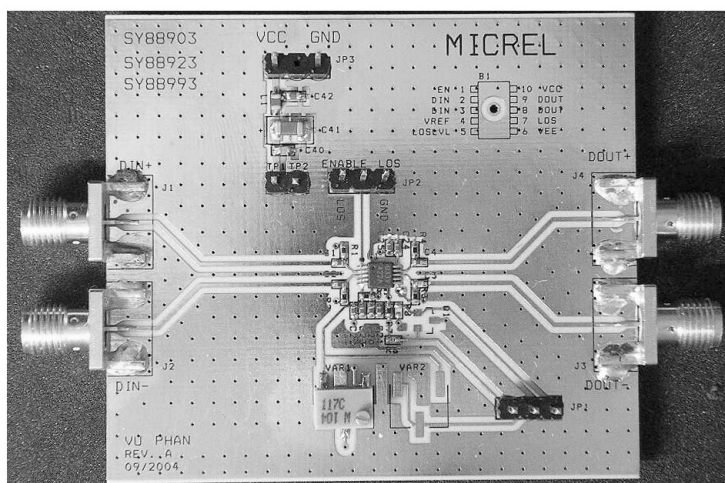
Features

- SY88303BL CML limiting post amplifier with wider loss-of-signal detection range
- Single +3.3V power supply
- AC-coupled configuration for direct interface with 50Ω test equipment
- On-board LOS sensitivity adjustment

Related Documentation

- SY88303BL datasheet: 3.3V, 3.2Gbps CML Limiting Post Amplifier with Wider Loss-of-Signal Detection Range

Evaluation Board



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October, 2007

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Evaluation Board Description

The SY88303BL evaluation board is designed to operate with a single 3.3V $\pm 10\%$ power supply and is configured with AC-coupled inputs and outputs. The high-speed input and output channels are brought out to SMA connectors through matched length AC-coupled differential strip-line traces.

AC-Coupled Input

The AC-coupled inputs automatically bias the input levels to the correct DC-operating point set by the V_{REF} jumper input. Therefore, the inputs can be driven by a differential signal smaller than 100mV (200mV_{PP}) without level-shifting or termination resistor network in the signal path.

AC-Coupled Output

The SY88303BL is configured with AC-coupled outputs allowing the board to interface directly with 50 Ω equipment. AC-coupling allows the board to use a single power supply. If only one output is being used, the unused complimentary output should be terminated into 50 Ω -to-ground.

SY88303BL AC-Coupled Evaluation Board Setup

This section explains how to connect and setup the SY88303BL evaluation board per Figure 1. Ensure proper ESD precautionary measures are taken before handling sensitive electronic equipment, including the SY88303BL evaluation board.

Measurements

Evaluating DOUT and /DOUT

1. Set a DC power supply to +3.3V and turn it off. Connect the positive lead to V_{CC} post and the negative lead to GND post.
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 SY88303BL evaluation board. Use matched-length differential cables.
4. Turn the power supply on.
5. Observe the DOUT and /DOUT outputs with a 50 Ω scope. The output rise and fall times should be less than 120ps, with an amplitude around 800mV differentially.

LOS Hysteresis Measurements

The SY88303BL evaluation board provides a potentiometer to allow for convenient adjustment of LOS_{LVL} without the need for an extra power supply. LOS_{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_{LVL} can be set to any voltage between V_{CC} and $V_{CC} - 1.3$, as specified in the SY88303BL data sheet. The potentiometer creates a voltage divider. Thus,

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

Where: R is the resistance of the potentiometer VAR1 from V_{CC} to the tap at LOS_{LVL}. The steps below show how to measure the LOS 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 function is between 20mV_{pp} and 100mV_{pp}. For more information, please see the SY88303BL Datasheet.

1. Set a DC power supply to +3.3V and turn it off. Connect the positive lead to V_{CC} post and the negative lead-to-GND post.
2. Connect a DMM or similar voltage measurement device between the LOS_{LVL} pin and V_{CC} .
3. Connect a second DMM or similar voltage measurement device between the LOS output and GND. For the remainder of this document, this DMM will be referred to as the LOS DMM.
4. Connect the pattern generator with differential outputs as a data source to the DIN and /DIN inputs on the SY88303BL evaluation board. Use matched-length differential cables.
5. Turn the power supply on.
6. Adjust the trimpot VAR1 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 output should go HIGH or LOW (measured with the LOS DMM set up in step 3) as the input voltage swing at DIN and /DIN is varied around 20mV_{PP}. The input voltage at which the LOS output goes HIGH or LOW is the LOS assert voltage or LOS de-assert voltage, respectively.
7. Now adjust the trimpot is to vary the voltage so it is closer to V_{CC} . 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. On the contrary, as the LOS_{LVL} voltage moves away from V_{CC} , assert and de-assert levels are triggered by input voltage swings as small as 20mV_{PP}.

8. The hysteresis between assert and de-assert levels can be calculated with the following equation:

$$\text{Hysteresis (dB)} = 20 \log \left(\frac{\text{LOS De-assert voltage}}{\text{LOS Assert voltage}} \right)$$
 This hysteresis should be $>2\text{dB}$.

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	GND

Table 1. Layer Stack

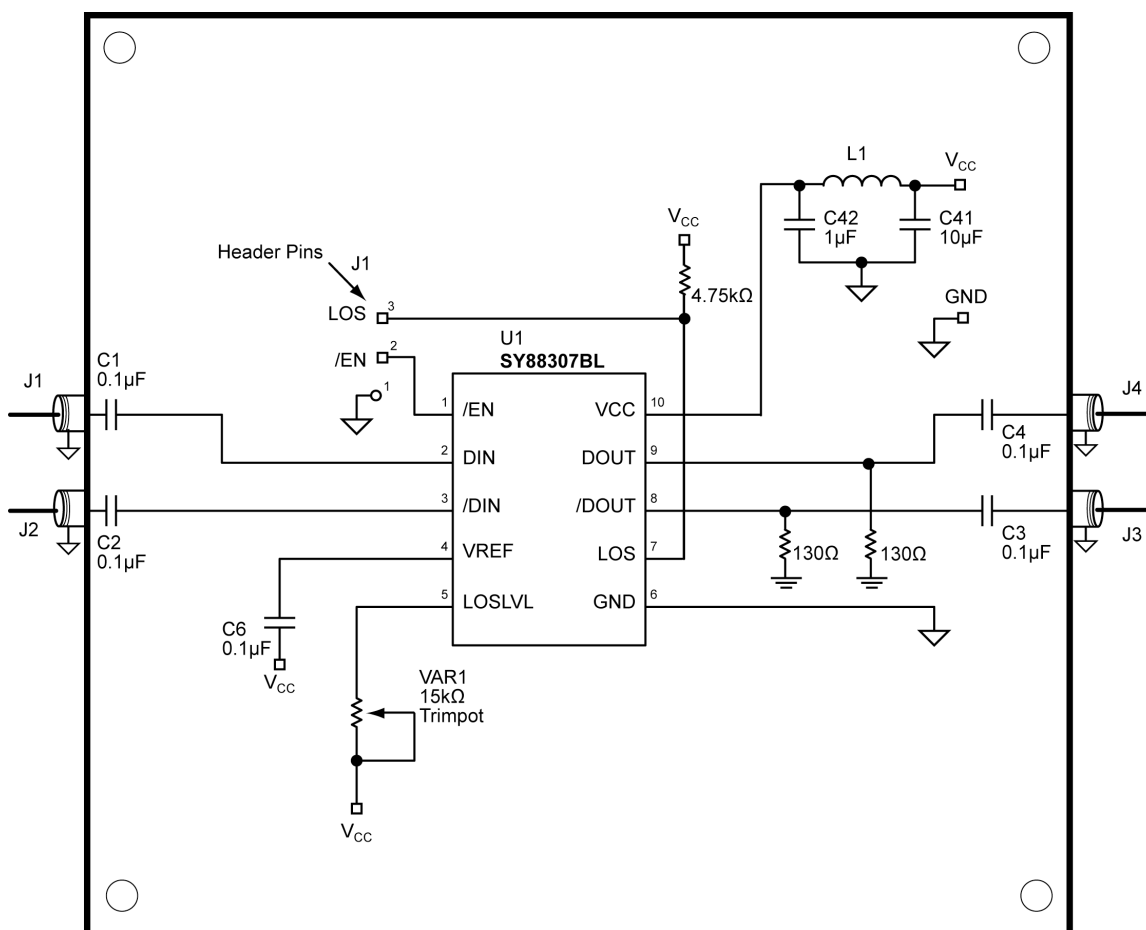


Figure 1. Setup for Measurement (MSOP Package).

Bill of Materials (MSOP)

Item	Part Number	Manufacturer	Description	Qty.
C1, C2, C3, C4, C21, C23, C25	VJ0402Y104KXXAT	Vishay ⁽¹⁾	0.1µF, 25V, 10% Ceramic Capacitor, Size 0402, X5R, Dielectric	7
C20, C22, C24	VJ0402Y222KXXAT	Vishay ⁽¹⁾	220pF, 25V, 10% Ceramic Capacitor, Size 0402, X5R, Dielectric	3
C40	VJ0603Y104KXXAT	Vishay ⁽¹⁾	0.1µF, 25V, 10% Ceramic Capacitor, Size 0603, X5R, Dielectric	1
C41	293D106X0025CT	Vishay ⁽¹⁾	10µF, Surface Mount Capacitor, Size C	1
C42	293D105X0025CT	Vishay ⁽¹⁾	1µF, Surface Mount Capacitor, Size C	1
L1	BLM21A102F	Murata ⁽²⁾	Ferrite Bead, Size 0603	1
JP1, JP2, JP3	TSW-103-07-S-S	Samtec ⁽³⁾	0.1mil Center through hole terminal strip	3
R1, R2, R6, R7	CRCW04025001F	Vishay ⁽¹⁾	5kΩ, 10%, 1/16W Resistor SMD, Size 0402	4
R3, R4, R8	CRCW04021300F	Vishay ⁽¹⁾	130Ω, 10%, 1/16W Resistor SMD, Size 0402	3
R5	CRCW04023011F	Vishay ⁽¹⁾	3kΩ, 10%, 1/16W Resistor SMD, Size 0402	1
VAR1	3269W-1-153G	Bourns ⁽⁴⁾	15kΩ Trimpot	1
J1–J4	142-0701-851	Johnson Components ⁽⁵⁾	Jack Assembly End Launch SMA	4
U1	SY88303BL	Micrel, Inc.⁽⁷⁾	Post Amplifier	1

Bill of Materials (MLF®)

Item	Part Number	Manufacturer	Description	Qty.
BP1	111-0702-001	Johnson Components ⁽⁵⁾	Red Binding Post	1
BP2	111-0702-001	Johnson Components ⁽⁵⁾	Black Binding Post	1
C1, C2, C3, C5, C7, C9, C10, C11, C13, C15, C40	PCC1731CT-ND	Panasonic ⁽⁶⁾	0.1µF Surface Mount Capacitor, Size 0402	11
C4, C6, C8, C12, C14, C42	PCC1915CT-ND	Panasonic ⁽⁶⁾	1µF Surface Mount Capacitor, Size 0603	6
C41	PCC1940CT-ND	Panasonic ⁽⁶⁾	10µF Surface Mount Capacitor, Size 1206	1
S1, S2, S4, S5	142-0701-851	Johnson Components ⁽⁵⁾	End Launch SMA	4
S3, S6	142-0701-201	Johnson Components ⁽⁵⁾	PC Mount SMA	2
TP1, TP2, TP3	TSW-101-07-S-S	Semtec ⁽³⁾	0.1mil Center Through Hole Terminal Strip	2
VAR1	3269W-1-254G	Bourns ⁽⁴⁾	250kΩ Potentiometer	1
U1	SY88303BL	Micrel, Inc.⁽⁷⁾	Post Amplifier	1

Notes:

1. Vishay: www.vishay.com.
2. Murata: www.murata.com.
3. Samtec: www.samtec.com.
4. Bourns: www.bourns.com.
5. Johnson Components: www.johnsoncomponents.com.
6. Panasonic: www.panasonic.com.
7. Micrel, Inc.: www.micrel.com.

HBW Support

Hotline: 408-955-1690

Email Support: HBWHelp@micrel.com

Application Hints and Notes

For application notes on Sensitivity and Hysteresis in Micrel Limiting Post Amplifiers, go to Micrel's website at: <http://www.micrel.com/PDF/HBW/App-Notes/an-45.pdf>.

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