SY88422L

Optical Evaluation Board

General Description

This optical evaluation board allows for evaluating the performance of the SY88422L while driving a laser. Since the part is designed to work with Micrel's MIC300x controller, which has an integrated APC loop, an external APC loop is implemented to allow the chip to drive the laser in close loop.

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

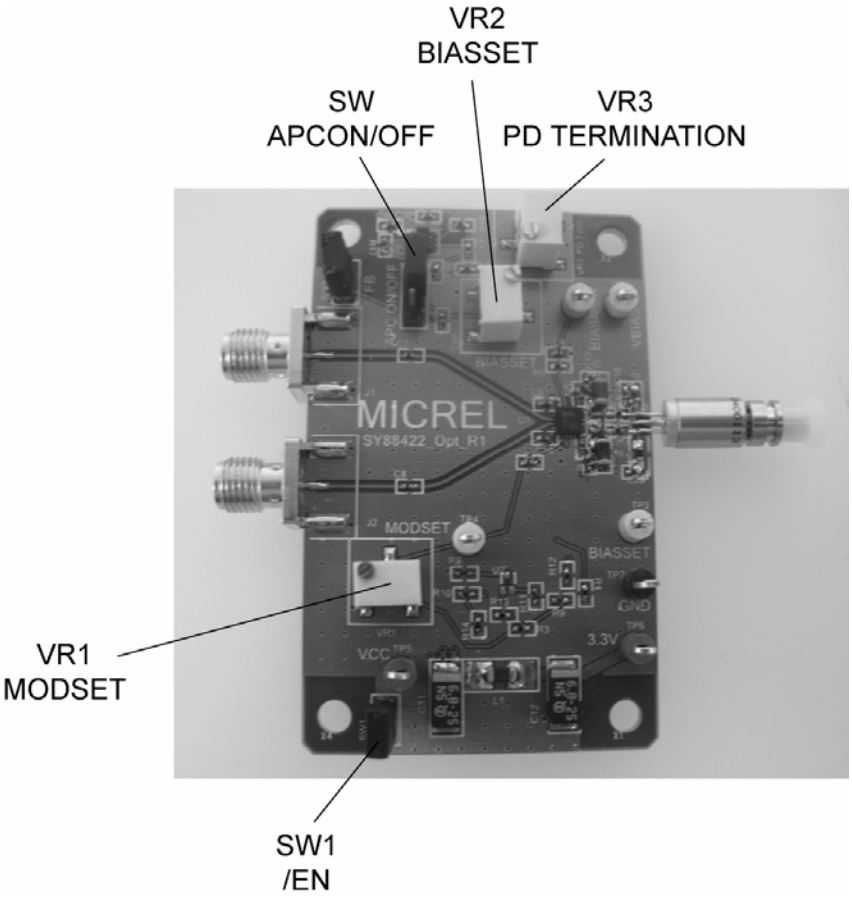
Features

- Open loop or close loop operation
- Manual modulation and bias setting

Related Support Documentation

- SY88422L Datasheet

Evaluation Board



TOSA Installation

Check the pin-out of the laser and install according to the diagrams as shown on Figure 1.

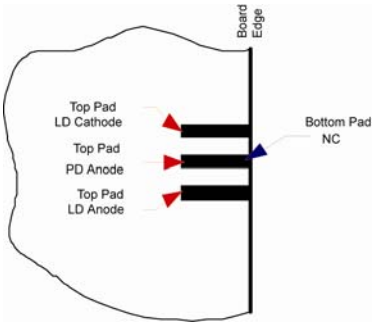


Figure 1. Mounting of the Laser

Board Setting (Open Loop Operation)

1. Install a jumper on SW1 to enable the SY88422L.
2. Install a jumper between pin 2 and pin 3 of SW3 and remove jumper from SW2 to operate the circuit in open loop.
3. Before powering the board, adjust potentiometers VR1 (MODSET) and VR2 (BIASSET) completely counterclockwise to set bias and modulation currents to zero "0".
4. Connect 3.3V to TP6 (red) and GND to TP5 (black) to power the board.
5. Connect the laser output to the optical module of the scope with a SMF jumper.
6. Turn VR2 clockwise to increase the bias current until the laser starts to emit light then turn VR1 clockwise to adjust modulation current. Continue to tweak bias and modulation current until an acceptable eye diagram is seen on the scope.

Close Loop Operation

Since the SY88422 has integrated bias only and no APC (designed to be used with MIC300x controller), and external APC loop was built.

1. Turn VR3 completely clockwise to minimize the bias current when closing the loop.
2. Move the jumper from pins 2 and 3 of SW3 to pins 1 and 2.
3. Install a jumper on SW2 (FB)
4. Turn VR3 counterclockwise until the light starts to come out of the laser then adjust MODSET (VR1) and BIASSET (VR2) to have an acceptable eye diagram.

Performance

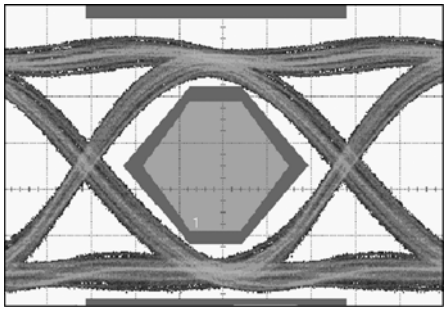


Figure 2. Optical Eye Diagram at 4.25Gbps

Laser Response Tuning

Overshoot/Undershoot

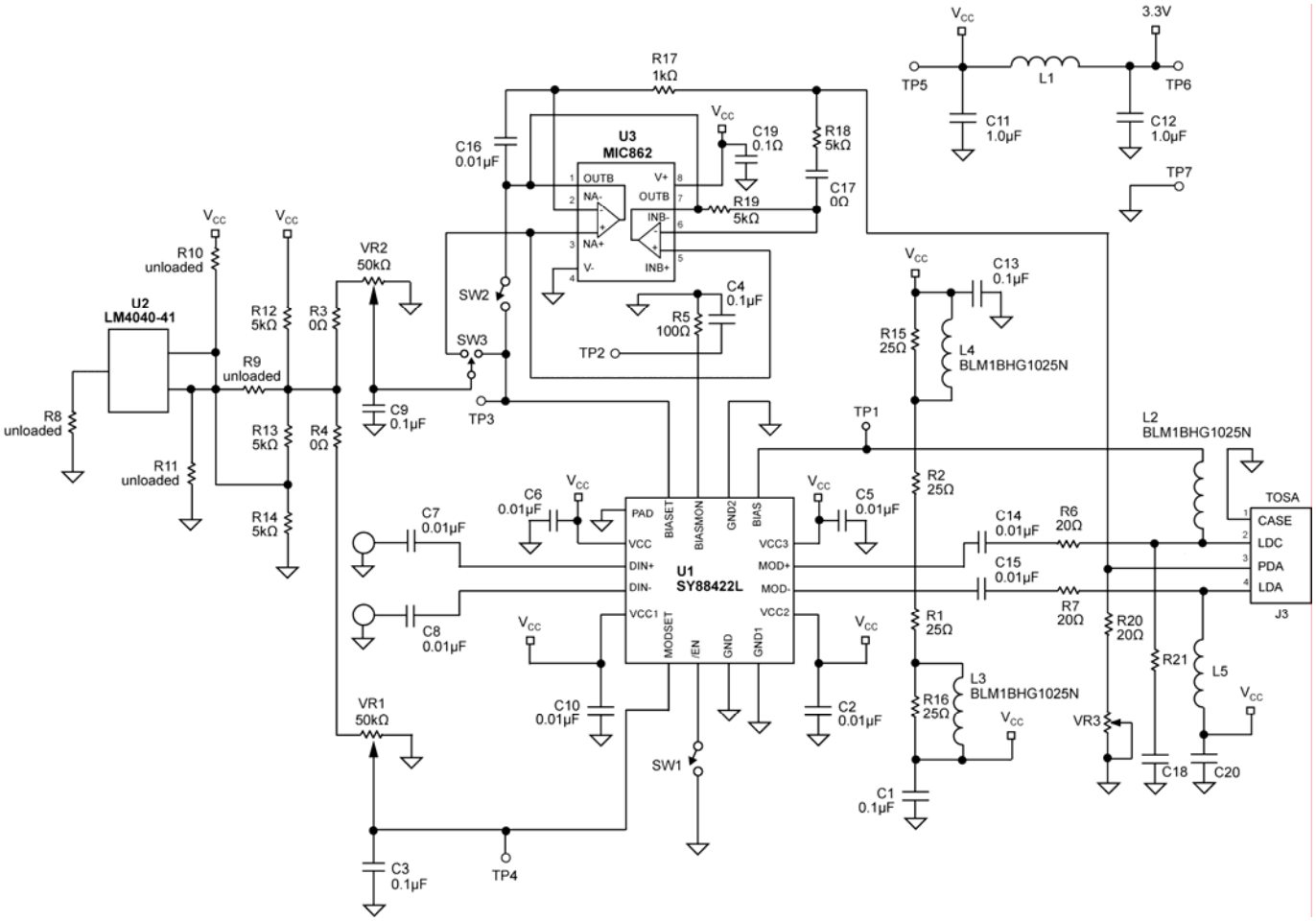
The damping resistors R6 and R7 installed in series with laser are 10Ω. This value might be changed to a higher value to minimize or suppress any overshoot or undershoot on the optical signal out of the laser, but keep in mind that higher value damping resistors will lead to higher rise/fall time.

The networks composed from (R2, R15, L4) and (R1, R16, L3) are used to bias the output of the driver and improve the laser response. The user can change the values installed to get better performance with his laser.

Laser's Package Inductance Compensation

A compensation network comprised of C18/R21 can be used to compensate for the laser package parasitic inductance. There are no specific values indicated on the schematic because the values will depend on the type of package and lead length. Capacitance from a few pF to 10nF combined with resistance from 50Ω to 200Ω can be used.

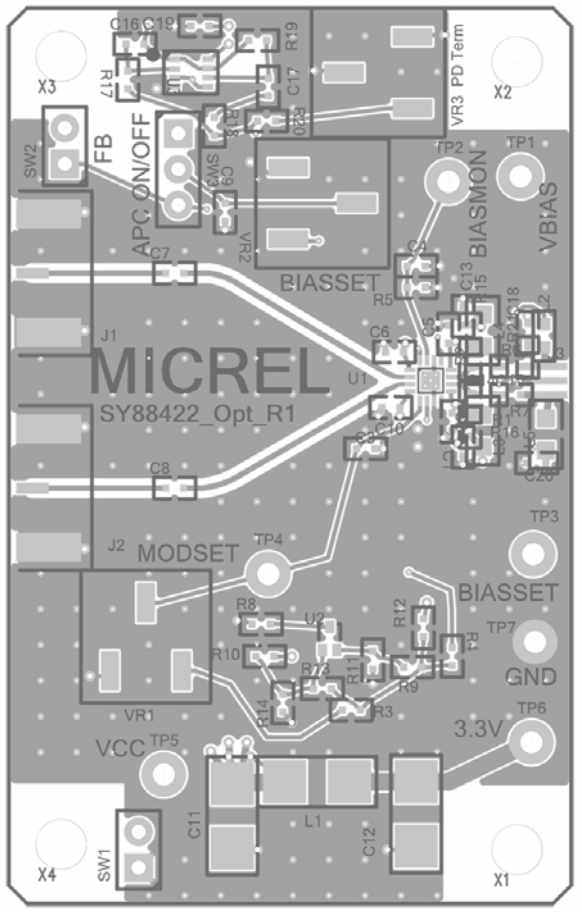
Evaluation Board Schematics



LM4040:
Install R12, R13 = 0, R15 = 0
Remove R10-R11, R14, R16

LM4041:
Install R10, R11, R14, R15 = 5.1k, R16
Remove R12, R13

PCB Layout/Assembly



Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1-10, C13-16, C19, C20		Vishay[1]	0.1μF, 0402, Ceramic Capacitor	16
C11, C12	ECSH0GY106R	Panasonic[2]	10μF, Y, Tantalium Solid Electrolytic Capacitor	2
C17		Vishay[1]	0Ω Resistor	1
C18		Vishay[1]	120pF, Size 0402, Ceramic Capacitor	1
J1, J2	142-0701-851	Johnson Components[3]	SMA End Launch Receptacle Connector	2
J3			TOSA, Laser Subassembly	1
L3, L4			30μH Ferrite bead inductor	2
L1, L5			1.2μH Ferrite bead inductor	2
R1, R2	CRCW040210R0F	Vishay[1]	10Ω resistor	2
R3, R4	CRCW04020R00F	Vishay[1]	0Ω resistor	2
R5	CRCW04021000F	Vishay[1]	100Ω resistor	1
R6, R7	CRCW040215R0F	Vishay[1]	15Ω resistor	2
R12-14, R18, R19	CRCW04025001F	Vishay[1]	5kΩ resistor	5
R15, R16	CRCW040233R0F	Vishay[1]	33Ω resistor	2
R17	CRCW04021001F	Vishay[1]	1kΩ resistor	1
R20, R21	CRCW04021400F	Vishay[1]	140Ω resistor	2
SW1, SW2	TSW-1-2-07-G-S	Samtec[4]	Header, 2 positions	2
SW3	TSW-1-3-07-G-S	Samtec[4]	Header, 3 positions	1
VR1, VR2, VR3	3269 W-1-503 GLF	Bourns[5]	50K SMD Trimming potentiometer	3
TP1-TP5	5014	Keystone[6]	Color Coded PCB test point, Yellow	5
TP6	5010	Keystone[6]	Color Coded PCB test point, Red	1
TP7	5011	Keystone[6]	Color Coded PCB test point, Black	1
U1	**SY88422L**	**Micrel[7]**	**4G Laser Driver**	**1**
U2	**LM4040-41**	**Micrel[7]**	**Precision Micropower Shunt-Voltage Reference**	**1**
U3	**MIC862**	**Micrel[7]**	**Dual Low Power Operational Amplifier**	**1**

Notes:

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

HBW Support

Hotline: 408-955-1690

Email Support: HBWHelp@micrel.com

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA

TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB http://www.micrel.com