SY88232L and SY88236L

Optical Evaluation Board

General Description

This evaluation board allows for checking the performance of the SY88236 burst mode laser driver and the continuous mode laser driver SY88232 while driving a FP or a DFB laser and its integrated post amplifier driven by a ROSA.

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

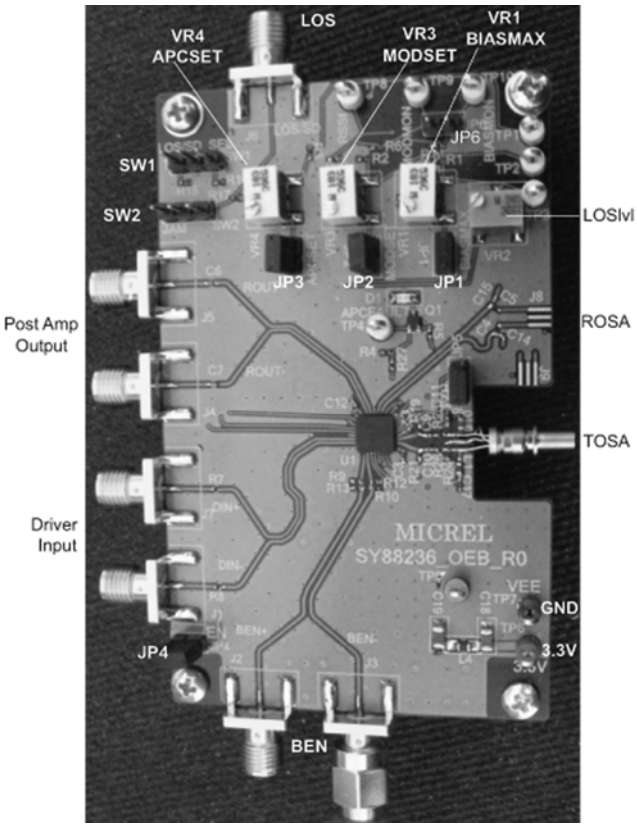
Features

- Open loop or close loop operation
- Modulation, biasmax and bias setting
- Post amplifier LOS/SD level setting

Related Support Documentation

- SY88236L-AL and SY88232L-AL Datasheets

Evaluation Board



Installation of the Optics

The board accepts triplexer/diplexer or separated TOSA and ROSA

Triplexer/Diplexer Installation

Connect the laser leads on J10 and Receiver leads on J9 as shown below:

TOSA/ROSA Installation

Install the TOSA on J10 and the ROSA on J8 as sown below:

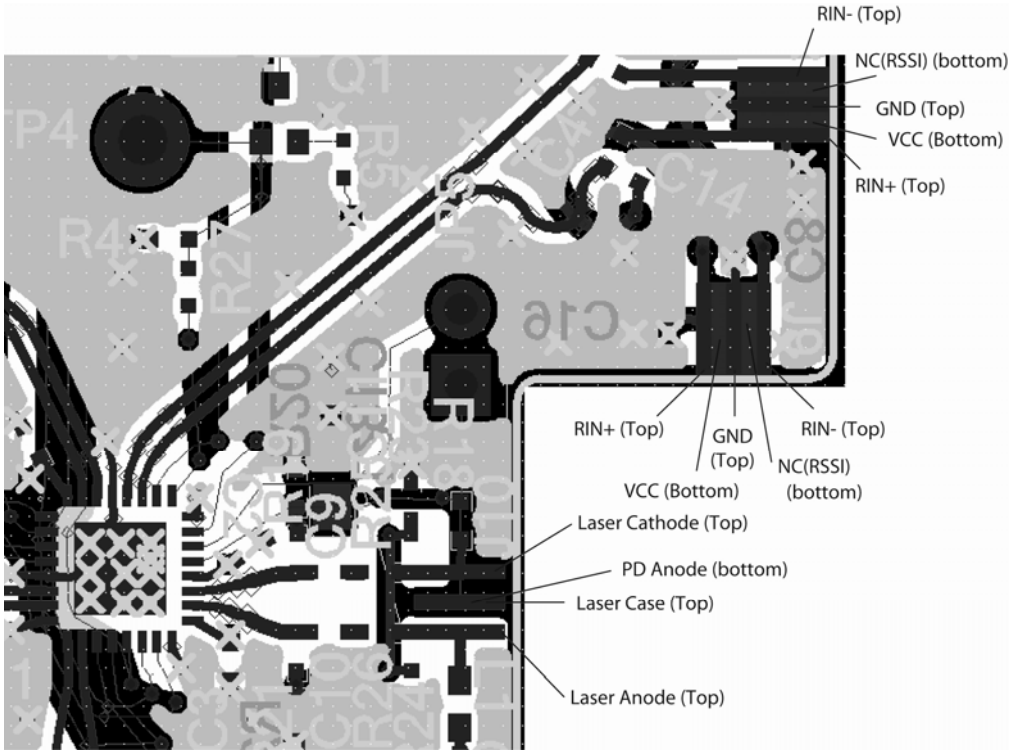


Figure 1. Optics Installation

Driver Setting and Operation

Note that the board is set for burst-mode application, which requires the driver to be DC-coupled to the laser. The differences in configuring the board with DC- or AC-coupled lasers are shown below in Table 1.

	Installed	**Removed**
DC coupling	• C9, C10 replaced with 0Ω resistors • 3pF in series with 100Ω added across the outputs of the driver for compensation. This RC network is not on the schematic, nor on the layout. See Figure 2 on how they are installed.	R19, R21
AC coupling	• R19-22, L2-3, C12-13 • C11/R24 or C11/R23 • C9, C10 = 0.1µF • R7, R8 replaced with 0.1µF capacitors • R18 replaced with inductor BLM18HG102SN	3pF in series with 100Ω removed from the driver output

Table 1. Board Setting for DC and AC Coupling

Compensation RC Network

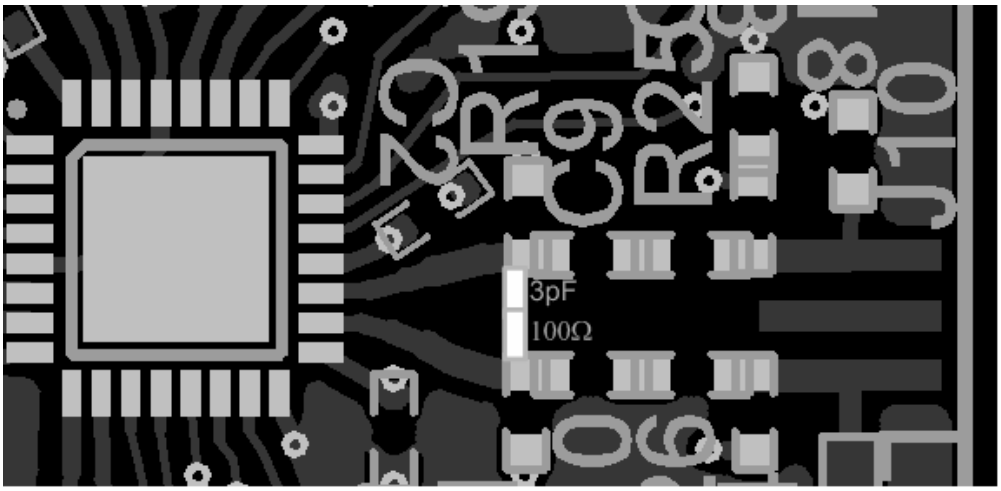


Figure 2. Installation of the Compensation RC Network across the Outputs of the Driver

1. Install a jumper on JP4 to enable the driver.

Continuous Mode Operation (SY88232 and SY88236)

To operate the chip in continuous mode, Connect BEN+ to VCC (resp. BEN- to GND) by installing a 50Ω or 0Ω load on J2 (resp. J3) SMA Connector.

Adjust potentiometers VR1 (BIASMAX), VR3 (MODSET), and VR4 (APCSET) completely counterclockwise to set bias and modulation currents to zero "0" before powering the board.

If the inputs DIN+/DIN- are DC coupled, set the output of the pattern generator high level within the range 0.6V-1.5V first then connect the input DIN+/DIN- (J7/J1) to the output of the pattern generator.

Connect the output of the laser to the optical input of the scope

Open Loop Operation

Install jumpers on JP1 (BIASMAX), JP3 (APCSET), and JP2 (MODSET). Make sure that there is no jumper on JP5 (PD Feedback).

Connect 3.3V to TP6 (red) and GND to TP7 (black) to power the board.

Turn VR1 clockwise, BIASMAX sets the bias current in open loop operation, to increase the bias current until the scope indicates a change in the optical power.

Turn VR3 clockwise to set modulation.

Keep adjusting bias current and modulation current until the scope shows a good eye diagram with an extinction ratio of about 10dB.

Bias Current can be measured across R18.

The current from pin 15 represents $I_{MOD}/100$. With R6 = 100Ω, the voltage measured on TP9 in mV represents the modulation current (I_{MOD}) in mA.

The current from pin 23 represents $I_{BIAS}/50$. With R14 = 100Ω, the voltage measured on TP10 in mV represents two times the bias current ($2xI_{BIAS}$) in mA.

Close Loop Operation

Install a jumper on JP5 (PD Feedback) to close the loop.

Adjust bias current (VR4) to restore the eye diagram.

Burst Mode Operation (SY88236 only)

Disconnect BEN+ from VCC and/or BEN- from GND whichever is connected and connect BEN + and BEN- to the outputs of the BEN signal generator.

Connect the trigger output of the BE signal generator to the trigger input on the scope.

Select the frequency of the BEN signal to have BEN high for at least 50ns per cycle to give enough time to the driver modulation current and bias settle to the nominal values before they're turned off when BEN switches Low.

Post Amplifier Setting and Operation

Install a jumper between pin 1 and pin 2 of SW2 to enable the output of the post amplifier.

First proceed with the driver setting as described above, then connect the laser output to an optical attenuator and adjust the signal at the output of the optical attenuator to a safe level for the receiver -3dBm or lower.

Connect the output of the attenuator to the ROSA on the evaluation board.

Connect the output of the post amplifier SMA connectors J4 and J5 to the inputs of the scope to check the signal at the receiver output.

Install a jumper between pin 2 and pin 3 of SW1 to select LOS (between pin 1 and pin 2 to select SD).

Adjust VR2 to a value between 100Ω and 15KΩ to set the LOSLVL to a value corresponding to desired sensitivity. Higher resistance value corresponds to higher sensitivity (lower input signal level).

Move the jumper on SW2 to pin2-pin 3 to apply LOD/SD output to JAM input and activate the squelch function.

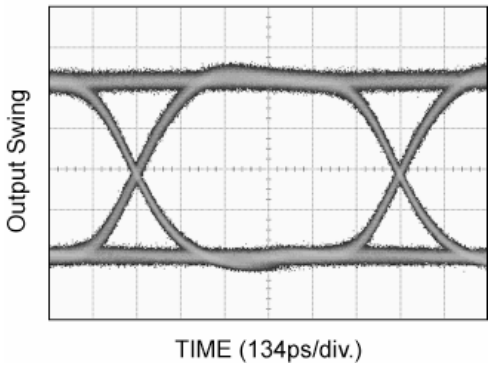
Vary the input signal around the sensitivity level set by LOSLVL to check the functionality of the squelch function. If LOS is selected and the input signal goes below the sensitivity level, LOS is asserted and the output of the post amplifier is turned off. If the signal is increased, the LOS will de-Assert when the input signal reaches a certain level, and the output of the post amplifier is turned ON.

The same experiment can be done with SD selected.

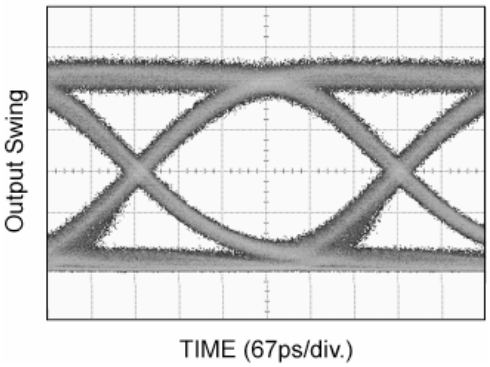
The receive signal strength (RSSI) can be measured between TP10 and ground (V_{EE}).

Performance

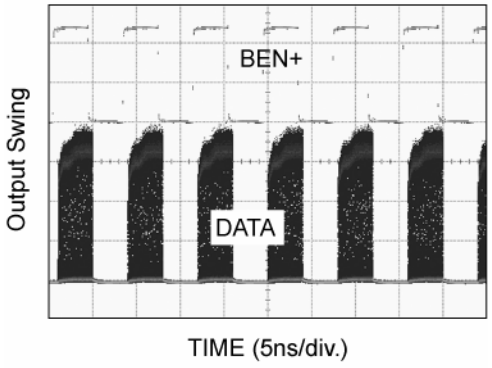
Optical Eye Diagram @1.25Gbps with 2.3G Filter Laser DC Coupled to the Driver



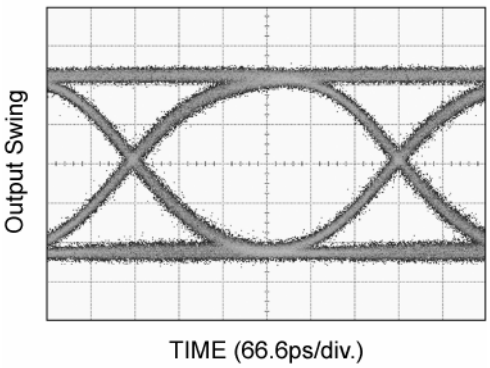
Optical Eye Diagram @2.5Gbps with 2.3G Filter Laser DC Coupled to the Driver



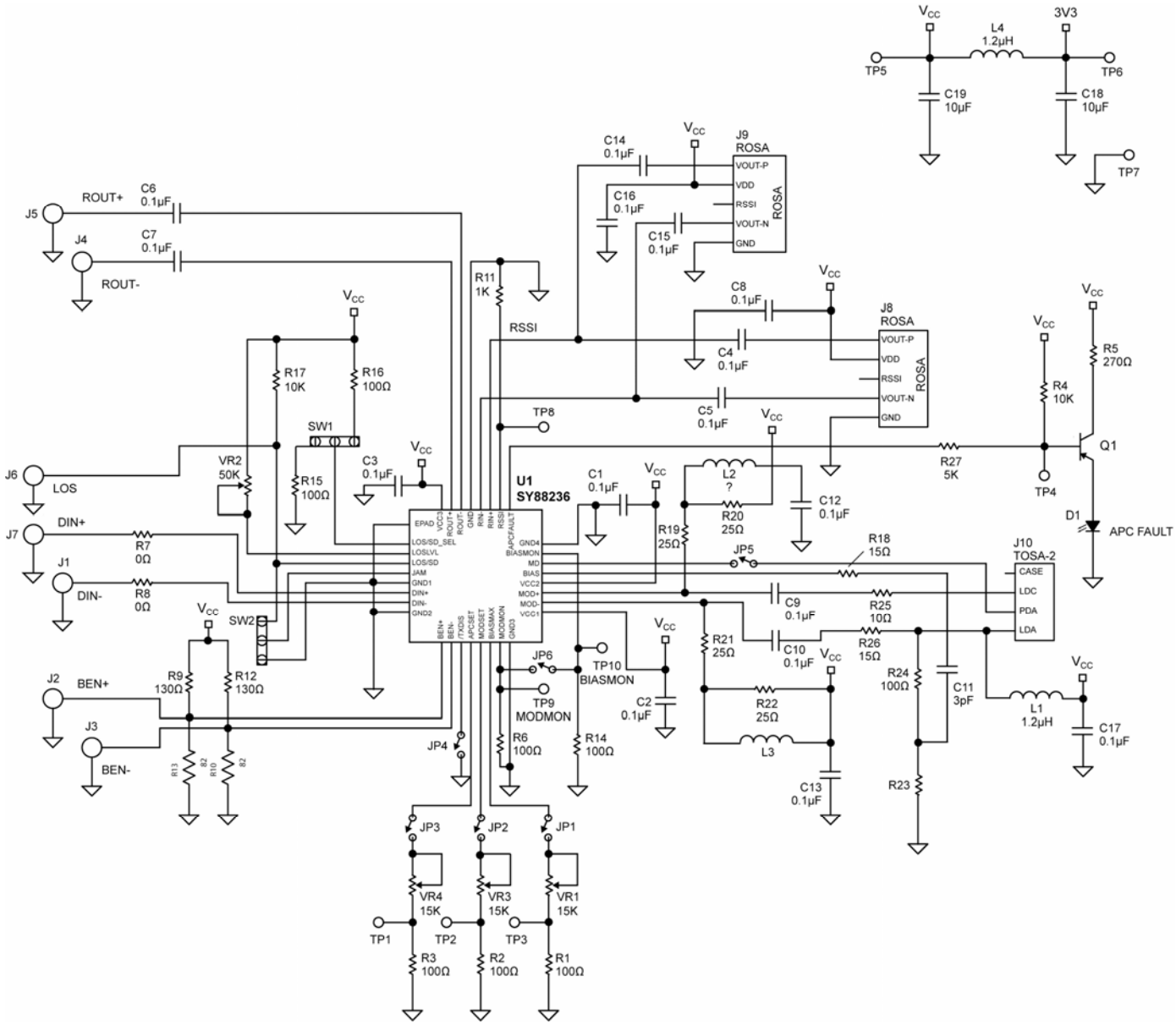
Burst Mode Operation with Laser



Electrical Eye Diagram @2.5Gbps RIN = 5mV$_{PP}$

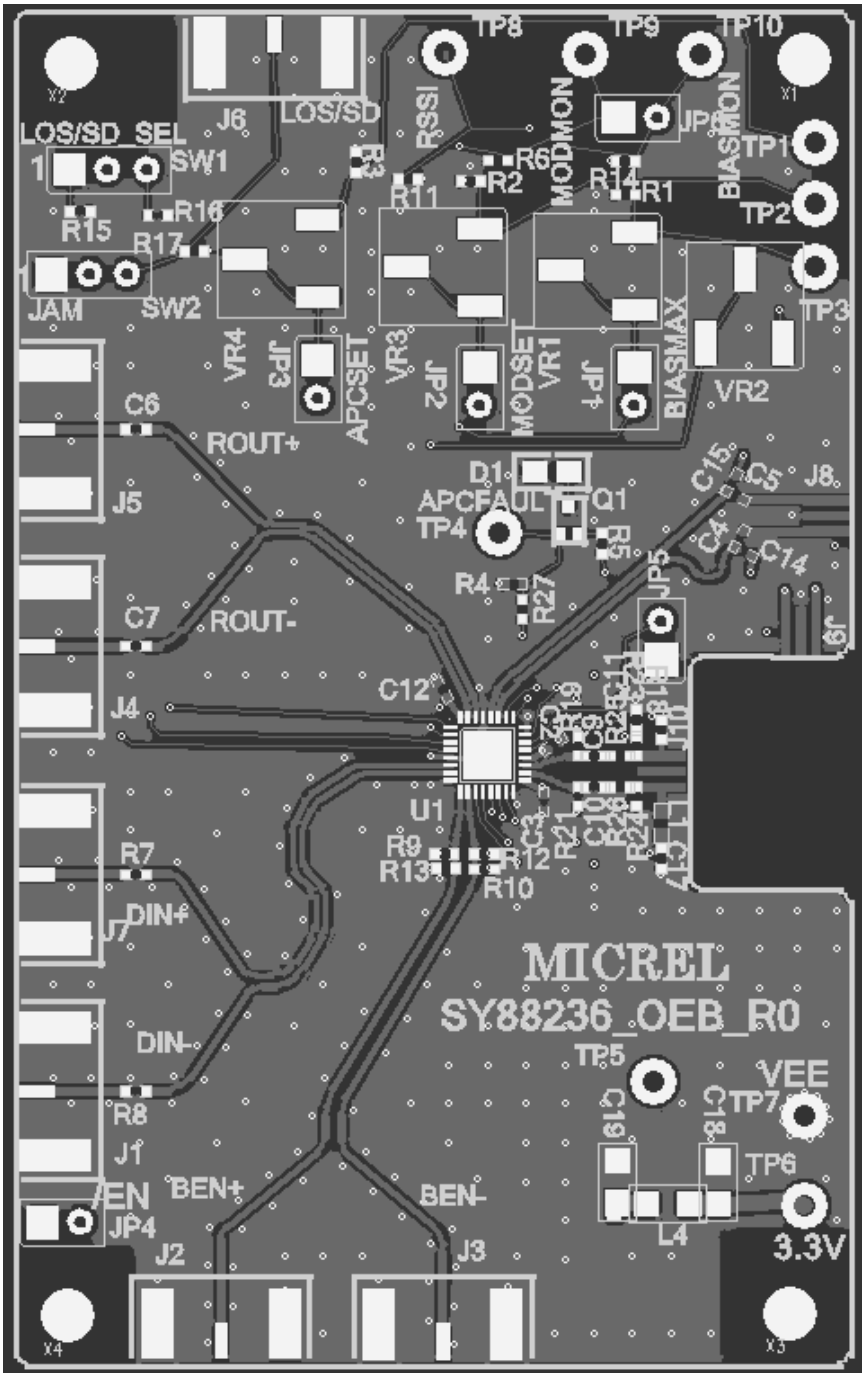


Evaluation Board Schematics



hbwhelp@micrel.com or (408) 955-1690

PCB Layout/Assembly



Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1-8, C12-17		Vishay[1]	0.1µF Ceramic Capacitor, Size 0402	16
C9-10	CRCW04020R00F	Vishay[1]	0Ω Resistor	2
C18-19	ECSH0GY106R	Panasonic[2]	10µF Tantalum Solid Electrolytic Capacitor, Y	2
D1	67-1636-1-ND	Digikey[3]	Red LED	1
J1-7	142-0701-851	Johnson Components[4]	SMA End Launch Receptacle Connector	7
J8			ROSA, Laser Subassembly	1
J10			TOSA, Laser Subassembly	1
JP1-JP6	TSW-1-2-07-G-S	Samtec[5]	Header, 2 Positions	6
L1, L4		Vishay[1]	1.2µH Ferrite Bead Inductor, Size 0603	2
Q1	MMTB3906WT1	ON Semiconductor[6]	PNP Transistor	1
R1-R3, R6, R14-16	CRCW04021000F	Vishay[1]	100Ω Resistor	7
R4, R17	CRCW04021002F	Vishay[1]	10kΩ Resistor	2
R5	CRCW04022700F	Vishay[1]	270Ω Resistor	1
R7-8, C9-10	CRCW04020R00F	Vishay[1]	0Ω Resistor	4
R9, R12	CRCW04021300F	Vishay[1]	130Ω Resistor	2
R10, R13	CRCW040282R0F	Vishay[1]	82Ω Resistor	2
R11	CRCW04021001F	Vishay[1]	1kΩ Resistor	1
R18, R25-26	CRCW040210R0F	Vishay[1]	10Ω Resistor	3
R27	CRCW04025001F	Vishay[1]	5kΩ Resistor	1
SW1, SW2, SW3, SW4	TSW-1-2-07-G-S	Samtec[5]	Header, 2 Positions	4
TP1-TP5, TP8-10	5014	Keystone[7]	Color Coded PCB Test Point, Yellow	8
TP6	5010	Keystone[7]	Color Coded PCB Test Point, Red	1
TP7	5011	Keystone[7]	Color Coded PCB Test Point, Black	1
VR1-VR4	3269 W-1-503 GLF	Bourns[8]	50K SMD Trimming Potentiometer	4
U1	**SY88236L**	**Micrel, Inc.[9]**	**2.5G Burst Mode Laser Driver**	**1**

Notes:

1. Vishay: **www.vishay.com**.
2. Panasonic: **www.panasonic.com**.
3. Digikey: **www.digikey.com**.
4. Johnson components: **www.johnsoncomponents.com**.
5. Samtec: **www.samtec.com**.
6. ON Semiconductor: **www.onsemi.com**.
7. Keystone: **www.keyelco.com**.
8. Bourns: **www.bourns.com**.
9. **Micrel, Inc**.: **www.micrel.com**.

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