

**OAT2531U-S-05****Preliminary**

MU duplex Transceiver at 2.5 Gbit/s

**GENERAL DESCRIPTION**

The OAT2531U-S-05 transceiver is a long wavelength optical transceiver intended for 2.488 Gbit/s applications such as SONET SR OC-48 and SDH I-16. The transceiver is operated from single 3.3 V DC power supply and with LVPECL logic interface. Package style is the multisourced  $2 \times 5$  pins small form factor with integral MU duplex connector interface. The transceiver is provide double port densities from traditional SC  $1 \times 9$  transceiver. The laser output is certified to be Class 1 laser safe as defined by IEC 60825-1.

**FEATURES**

- Multisourced  $2 \times 5$  pins small form factor package
- MU duplex connector interface
- Compliant with SONET SR OC-48, SDH I-16
- Up to 2 km with 9/125  $\mu\text{m}$  SMF
- Single 3.3 V power supply
- LVPECL logic compatible data interface
- 1300 nm fabry perot laser with automatic power control
- Class 1 Laser eye safe
- 0°C to 70°C operating temperature range
- Transmitter disable input
- TTL signal detect output

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	$T_S$	-40	85	°C
Operating Temperature	$T_A$	0	70	°C
Lead Soldering Temperature	—	—	260/10	°C/s
Supply Voltage	$V_{CC}$	—	5	V
Input Voltage	$V_I$	0	$V_{CC} + 0.5$	V

**TRANSCEIVER OPTICAL AND ELECTRICAL CHARACTERISTICS**

( $T_C = 0^{\circ}C$  to  $70^{\circ}C$ ,  $V_{CC} = 3.135 V$  to  $3.465 V$ )

Parameter	Notes	Symbol	Min.	Typ.	Max.	Unit
Supply Current		I <sub>CC</sub>		200	250	mA

Transmitter Section

Parameter	Notes	Symbol	Min.	Typ.	Max.	Unit
Average Optical Output Power		P <sub>O</sub>	-10		-3	dBm
Optical Wavelength		λ <sub>C</sub>	1266	1310	1360	nm
RMS Spectral Width		Δλ			4	nm
Extinction Ratio		ER	8.2			dB
Optical Wave Form	1		Compliant with ITU-T G.957 eye mask			
Differential Input Voltage		V <sub>IN</sub>	0.4		1.0	V
Data Input Voltage Levels	2	V <sub>IL</sub>	V <sub>CC</sub> - 1.810		V <sub>CC</sub> - 1.475	V
		V <sub>IH</sub>	V <sub>CC</sub> - 1.165		V <sub>CC</sub> - 0.880	V
Transmit Disable Voltage	Disable	3	V <sub>ID</sub>	2.0		V
	Enable	3	V <sub>IE</sub>		0.8	V
Input Impedance	5	R <sub>IN</sub>	95	100	105	Ω
Optical Connector repeatability				0.15		dB

Receiver Section

Parameter	Notes	Symbol	Min.	Typ.	Max.	Unit
Optical Input Sensitivity	4	P <sub>IN</sub>			-18	dBm
Maximum Optical Input	4	P <sub>MAX</sub>	-3			dBm
Optical Wavelength			1266		1360	nm
Return Loss			27	35		dB
Output Voltage Levels	2	V <sub>OL</sub>	V <sub>CC</sub> - 1.810		V <sub>CC</sub> - 1.620	V
		V <sub>OH</sub>	V <sub>CC</sub> - 1.025		V <sub>CC</sub> - 0.880	V
Signal Detect Output Voltage	High	3	V <sub>OA</sub>	2.4		V
	Low	3	V <sub>OD</sub>		0.4	V
Assert Level		P <sub>A</sub>			-18	dBm
Deassert Level		P <sub>D</sub>	-30			dBm
Hysteresis		P <sub>HYS</sub>	0.5		4	dB

Notes:

1. Transmitter optical waveform characteristics are specified by an eye diagram shown in Figure 1. The eye mask test is performed using a receiver with a fourth-order Bessel Thompson filter discussed in ITU-T G.957
2. LVPECL compatible interface.
3. TTL compatible interface.
4. BER of  $1 \times 10^{-10}$  measured with 2.488 Gbit/s 2<sup>23</sup>-1 PRBS.
5. Measured between TD+ and TD-.

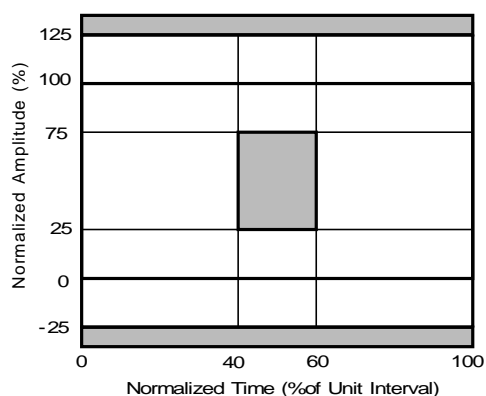


Figure 1. Transmitter Eye Diagram

## APPLICATION INFORMATION

### Electrical interface

Figure3 shows the recommended interface and power supply filtering circuit for operating the transceiver. TD+ and TD- inputs are internally terminated with differential 100Ω. The input signal that was terminated in the Serializer side are connected to TD+/TD- through the AC coupling capacitors. When the Serializer is LVPECL output then AC coupling capacitors are not required. RD+ and RD- outputs are LVPECL interface and not internally terminated. RD+ and RD- should be coupled to ground through 180Ω and connected to Deserializer through AC coupling capacitor. When the Deserializer inputs are LVPECL then AC coupling capacitors are not required.

### Signal Detect

The Signal Detect (SD) output is positive TTL logic. This output provides a logical low output signal when the optical signal into the receiver has been interrupted or the light level has fallen below the minimum signal-detect threshold. This signal is used to get a state of receiving DATA logically, not a BET monitor.

### Transmitter Disable

The Transmitter Disable (Tdis) input is a laser enable function. When Tdis is TTL logical low input or opened transmitter is normally operating. When Tdis is TTL logical high input transmitter optical output is shut down.

### Laser Eye Safety

The OAT2531U-S-05 is laser-based transceivers, and is Class 1 laser products. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. This is also eye safe when used within the data sheet limits. When optical connector unterminated, do not look into optical port with a magnifying glass and so on.

#### Caution:

**Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure. If this product is used with unauthorized revision, classification for laser product safety standard is invalid. The person performing such an act must classify the product at your responsibility and take appropriate actions according to the law.**

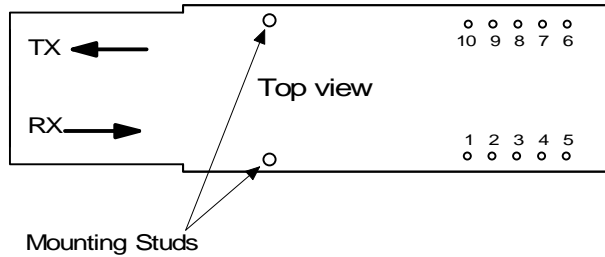
### Optical connector repeatability

The system designer is annoyed well from the unstableness of the optical output by the connector mating and demating of the transmitter. MU connector is very high performance connector. The OAT2531U-S-05 with MU duplex was designed carefully so as not to reduce this characteristic. Thus typical optical output change may be approximately less than 0.15dB.

### Receiver reflections

The optical reflection from the receiver makes a transmitter performance decline. Especially, when the transmission distance is short, this influence is conspicuous. The receiver of OAT2531U-S-05 is effectively internally terminated as optically. This product is certified that the reflection from the receiver is less than -27 dB. To use the MU connector that was PC-polished to maintain this performance is recommended.

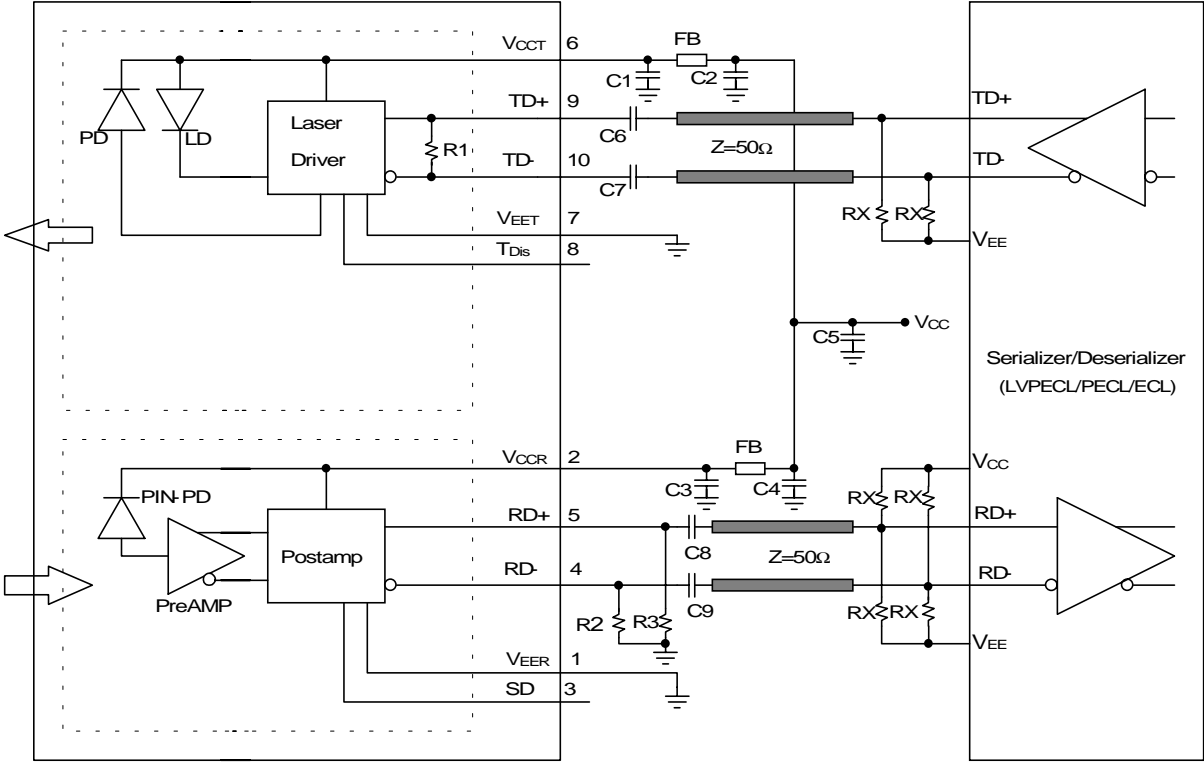
**PIN DESCRIPTION**



**Figure 2. Pin Description**

Pin	Symbol	Description
Mounting Studs		Two mounting studs are provided for transceiver mechanical attachment to the circuit board. They may also provide an optical connection of the transceiver to the equipment chassis ground.
1	$V_{EER}$	Receiver Signal Ground.
2	$V_{CCR}$	Receiver Power Supply.
3	SD	Signal Detect. Normal Operation: Logic "1" Output. Fault Condition: Logic "0" Output.
4	RD-	Received Data Out Bar. No internal terminations are provided.
5	RD+	Received Data Out. No internal terminations are provided.
6	$V_{CCT}$	Transmitter Power Supply.
7	$V_{EET}$	Transmitter Signal Ground.
8	$T_{DIS}$	Transmitter Disable. Normal Operation: Logic "0" Input or Open Transmit Disable: Logic "1" Input or Connect $V_{CC}$
9	TD+	Transmitter Data In. An internal 50 $\Omega$ termination is provided, consisting of a Thevenin termination.
10	TD-	Transmitter Data In Bar. An internal 50 $\Omega$ termination is provided, consisting of a Thevenin termination.

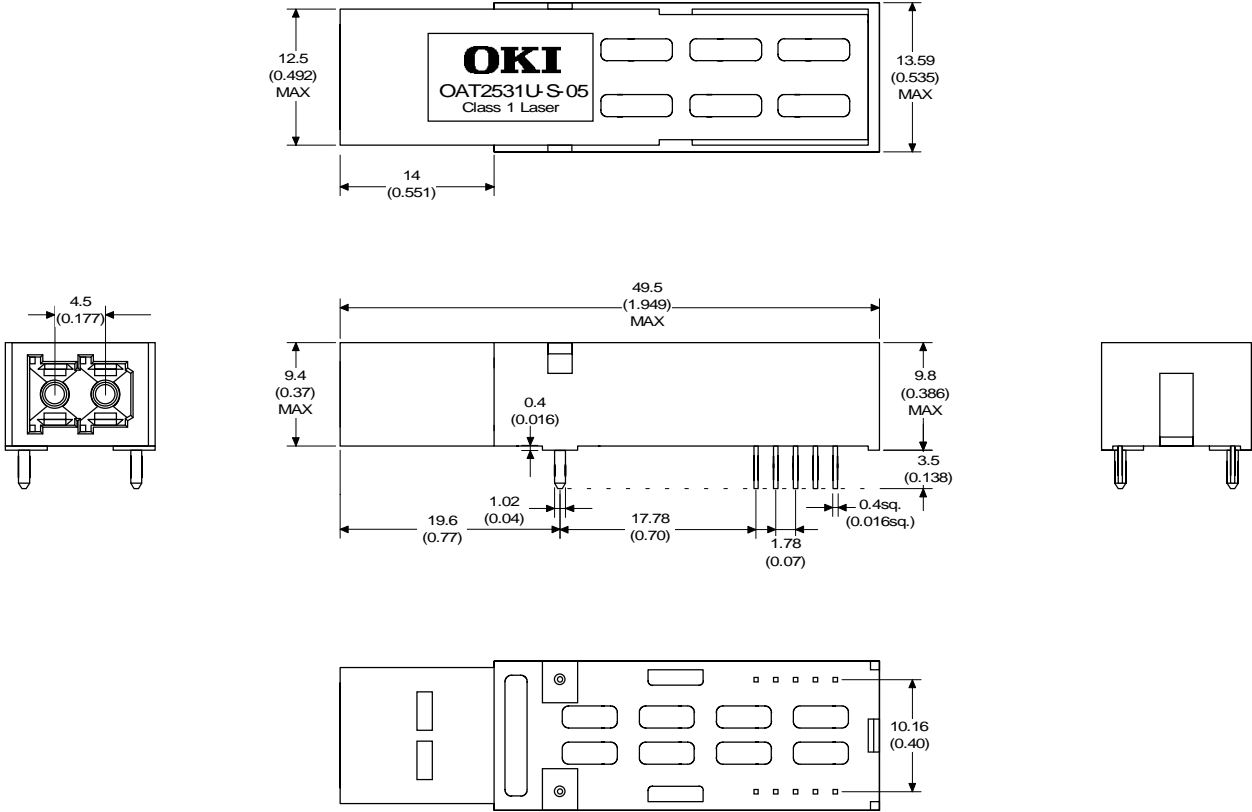
ELECTRICAL INTERFACE CIRCUITS



- Notes:
- C1 = C2 = C3 = C4 = 0.1 μF    C5 = 10 μF
  - C6 = C7 = C8 = C9 = 0.01 μF
  - R1 = 100 Ω
  - R2 = R3 = 180 Ω
  - FB = Ferrite bead (BLM11HA601SG)
  - RX = Depend on SELDES interface.

Figure 3. Recommended Interface Circuit

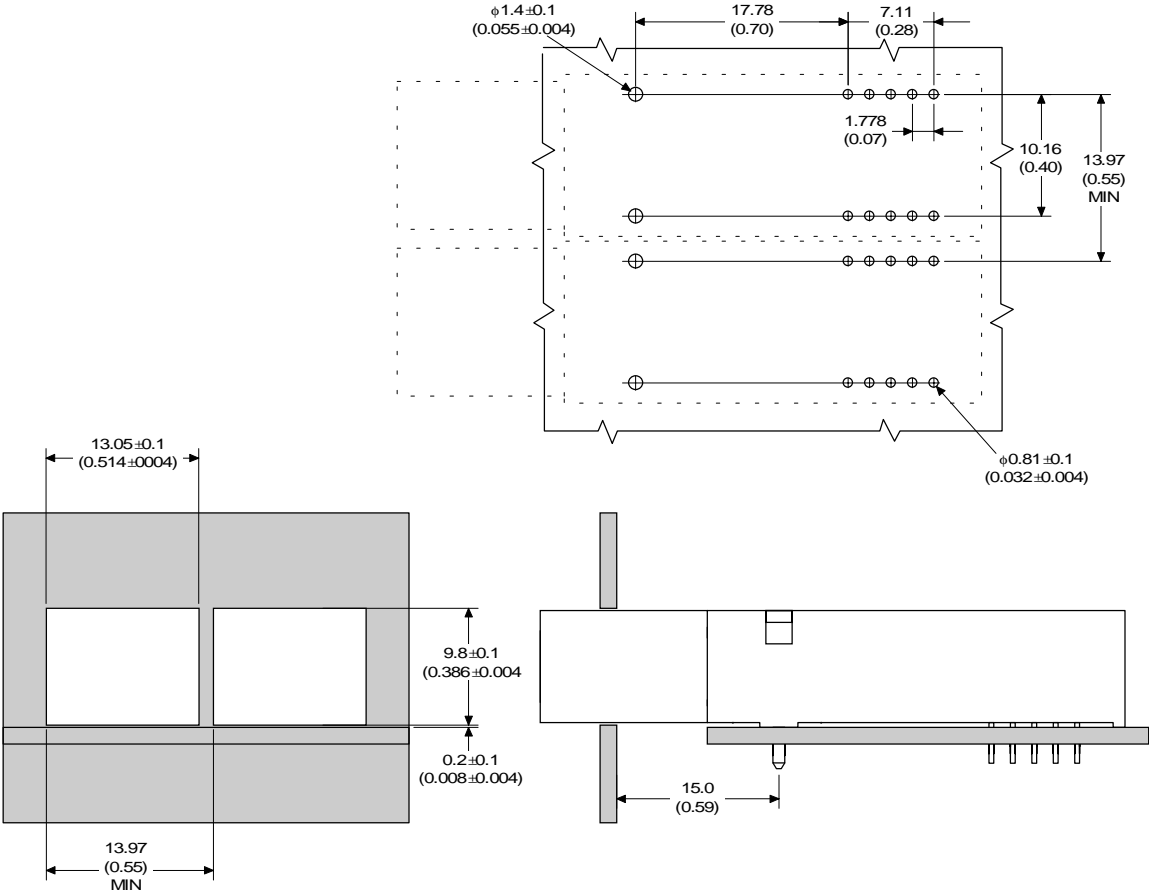
**PACKAGE OUTLINE**



Dimensions are millimeters (inches)

**Figure 4. Package Outline**

CIRCUIT BOARD LAYOUT AND PANEL OPENING



Dimensions are millimeters (inches)

Figure 5. Recommended Circuit Board Layout and Panel Opening

**NOTICE**

1. The information contained herein can change without notice owing to product and/or technical improvements. Before using the product, please make sure that the information being referred to is up-to-date.
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