

Please read this data sheet before purchasing, and keep it on file for future reference. It contains important information on the product specifications.

Optocom

Optoelectronics Group

OPT3445-5.Ø

OC-48 Optical Transmitter

Data Sheet

2004/5



210 Andover Street, Wilmington, MA 01887

Contents

General	3	Description
	3	Applications
	3	Standards Met
Function	3	Operation Features
	3	Operation Suggestions
	3	User Options
Ratings	4	Absolute Maximum Ratings
Operating Characteristics	4	Electrical
	5	Set/Hold Time Diagram
	5	Optical
	6	Eye Mask & Typical Output Waveform
Physical	6	Outline Diagram
	7	Dimensions
	7	Mounting & Connections
	7	Pin Designations
Safety	8	Laser Compliance Statement
	8	Optical
	8	Electrical
	8	Other
Appendix	8	Terms
Additional Information	9	Contact

General

Description

The OPT3445-5.0 is a 20-pin DIP fiber optic transmitter module which converts electrical data signals to lightwaves in the 1310 nm wavelength at data rates from 1 Mbps to 2.5 Gbps. The transmitter consists of a hermetic, 1.3 μm , InGaAsP/InP MQW DFB laser and a circuitry providing modulation, automatic optical power control and thermal compensation.

Applications

The device is designed for data communication systems and telecommunication transmission systems over singlemode fiber.

Standards Met

The specifications met are: the SONET/SDH STS-48/STM-16 interface, the Long Reach OC-48 Optical Parameters (LR-1) of Bellcore GR-253-CORE, the Long-haul Recommendation (L-16.1) of ITU-T G.957, and the monitor & alarm requirements of Bellcore GR-253-CORE & ITU-T G.783 and G.958.

Function

Operation Features

The OPT3445-5.0 optical transmitter operates using either a single +5 V or -5 V power supply. The device maintains electrical and optical stability over the specified temperature and voltage ratings. Outputs include the laser bias current monitor (LBM) voltage and the laser backface monitor (BFM).

To minimize input data pattern-dependent jitter, the differential clock signal may be connected to the data input latch, which is selected by an external LATCH (pin 20) control. If LATCH pin is high, the input data is retimed by the rising edge of CLOCK (+). If LATCH pin is low or left unconnected, the input data is directly used to drive the optical output. When this latch function is not used, PIN 11, PIN 13, and PIN 20 can be left open. In this case, the module is pin compatible to its lower data rate (OC-3, OC-12, and OC-24) versions.

Operation Suggestions

Operator can disable optical output through a user-provided electrical input.

User Options

For further uses of LBM and BFM, refer to Bellcore GR-253-CORE & ITU-T G.783.

Ratings

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage*	$V_{CC}-V_{EE}$	0	6.0	V
Operating Case Temperature Range	T_C	-40	85	°C
Operating Relative Humidity (non-condensing)	H_{OP}	---	85	%
Lead Soldering Temperature/Time	T/t	---	250/10	°C/s
Minimum Fiber Bend Radius	R_F	32/1.25	---	mm/in.
Storage Case Temperature Range	T_{STG}	-40	85	°C

* With V_{CC} and V_{EE} connected to (+5 V, 0 V) respectively, or with V_{CC} and V_{EE} connected to (0 V, -5.2 V) respectively.

Operating Characteristics

Electrical

Parameter	Symbol	Min	Typ	Max	Unit
dc Power Supply Voltage	$V_{CC} - V_{EE}$	4.75	5.0	5.25	V
dc Power Supply Current	I_{CC} OR I_{EE}	---	0.11	0.2	A
Input Data, Clock Voltage: ^{1,2}					
Low	V_{IL}	-1.95	-1.8	-1.45	V
High	V_{IH}	-1.16	-0.9	-0.7	V
Input Swing ³	V_{PP}	200	---	1600	mV
Common Mode Range	V_{CM}	$V_{CC} - 1.49$	---	$V_{CC} - 0.4$	V
Input Setup and Hold Time ⁴	T_{SU}, T_H	100	---	---	ps
Input Transition Time ⁵	t_I	---	0.402	---	ns
Transmitter Disable, Latch Voltage ⁶	V_D	2.0	---	V_{CC}	V
Transmitter Enable, Latch Voltage	V_{EN}	V_{EE}	---	$V_{EE} + 0.8$	V
Laser Bias Voltage ⁷	V_{LB}	0.01	---	0.70	V
Laser Facet Voltage ⁸	V_{BF}	0.01	---	0.30	V

¹ It is recommended for optimum performance to use \overline{DATA} & DATA inputs simultaneously.

² Data inputs are 10K, 10KH, 100K, 10E, and 100E ECL compatible. Voltage is in reference to VCC.

³ The input swing, is measured as the absolute difference between \overline{DATA} & DATA (or CLOCK & CLOCK) inputs.

⁴ See Figure 1.

⁵ Between 10% and 90% (50% duty cycle).

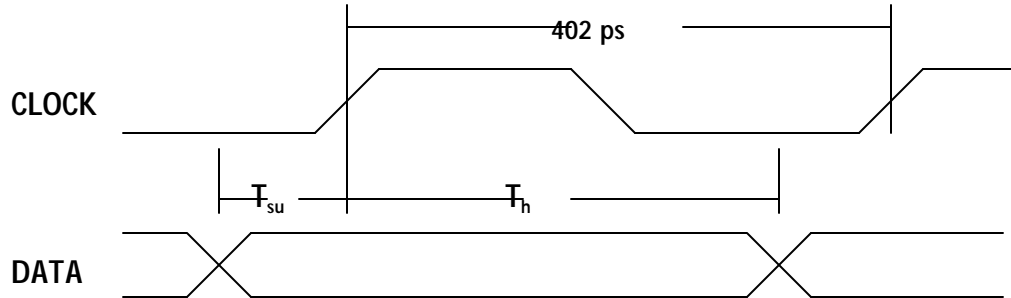
⁶ The transmitter remains enabled and requires the user to provide an external voltage to disable.

⁷ The laser bias current is determined to be the ratio of the voltage to an internal 10 Ω current-sensing resistor.

⁸ Laser facet current is determined to be the ratio of the voltage to an internal 200 Ω current-sensing resistor.

Operating Characteristics – continued

Figure 1. Set/Hold Time Diagram



Optical

Parameter	Symbol	Min	Typ	Max	Unit
Average Power Output ¹	P_0	-2	+1	+3	dBm
Operating Wavelength Range	λ	1280	1310	1335	nm
20 dB Spectral Width (SLM Laser)	$\Delta\lambda_{20}$	---	---	1	nm
Side-mode Suppression Ratio (SLM Laser)	SSR_{min}	30	---	---	dB
Extinction Ratio ²	E_r	8.2	---	---	dB
Optical Rise & Fall Times ³	t_r, t_f	---	---	0.15	ns
Jitter Generation, rms ⁴	GJ	---	---	0.005	UI
Output Waveform ⁵	SONET SDH Compliant				

¹ Measured using an electrical input with a $2^{23} - 1$ pseudorandom word having a 50% duty factor. It is also suitable to use additional measurement parameters and techniques specified in ITU-T Rec. G.957 and Bellcore GR-253-CORE. Optical loss of pigtail termination connector and measurement uncertainty is included in the numbers specified.

² The ratio of logic "1" to logic "0" average power levels calculated as $10\log_{10}(P_1/P_0)$ in dB.

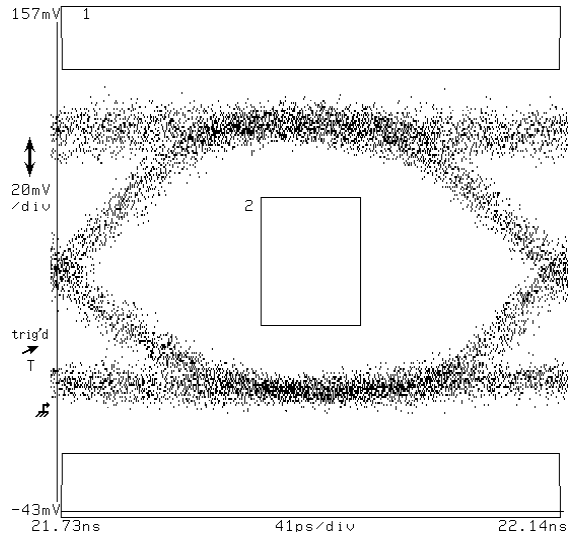
³ Measured with a 50% duty factor from the 10% to 90% points.

⁴ ITU-T Rec. G.958 and Bellcore GR-253 CORE (for Category II interfaces) list a fraction of the maximum amount of allowable generated jitter to allow for additional sources of jitter within the system. These ITU-T and Bellcore documents include information for measurement bandwidth specifications and techniques.

⁵ The optical output (see Figure 2) meets the eye diagram mask determined by GR-253-CORE (Fig. 4.3 of GR-253-CORE).

Operating Characteristics – continued

Figure 2. Eye Mask & Typical Output Waveform

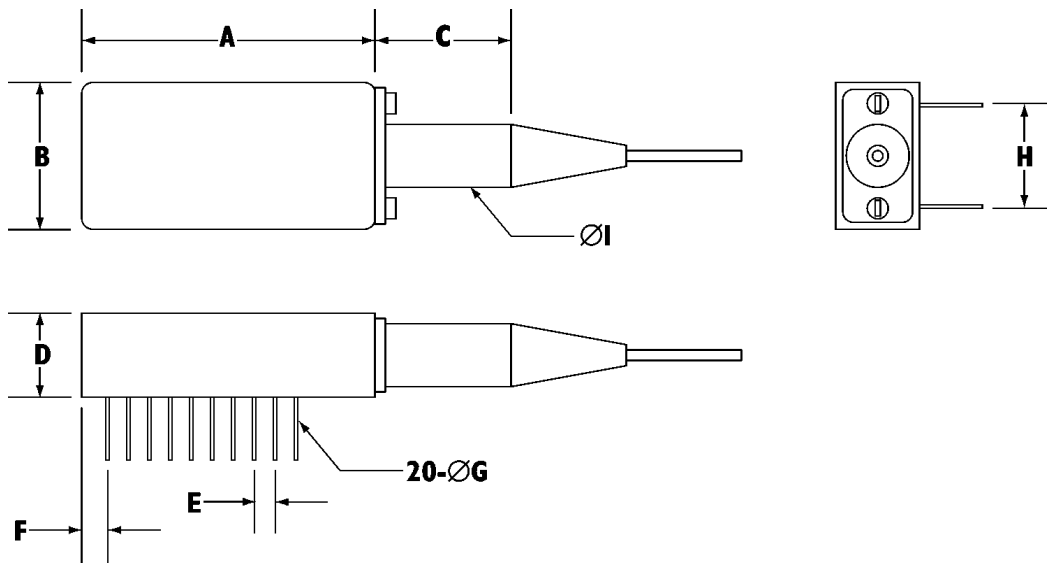


Bessel-Thomson filtered typical output waveform.

Physical Characteristics

The device package conforms to the 20-pin DIP outline shown in Figure 1. Dimensions for the package are also given in its corresponding Dimensions table.

Outline Diagram



Physical Characteristics – continued

Dimensions

Dimension	Typ	
	Inches	Metric (mm)
A	1.300	33.0
B	0.635	16.13
C	1.000	25.40
D	0.365	9.27
E	0.100	2.54
F	0.110	2.79
ØG	0.018	0.46
H	0.400	10.16
ØI	0.236	6.00

An assigned serial number in both barcode and human readable formats appear on this device. All markings and labels are permanent and meet the requirements of MIL-STD-883C-2015.7.

Mounting and Connections

The pigtail has a single-mode (SM) fiber with an 8 µm core. The outer jacket has a nominal 900 µm diameter and is terminated with an ST[®]*, FC, or SC Connector. Other connector

types may be available upon request. The minimal pigtail length is 1 meter (39.4 inches) long.

* ST[®] is a registered trademark of AT&T

Pin Designations

Pin	1	2	3	4	5	6	7	8	9	10
	NC	LBM(+)	NC	LBM(-)	V _{EE}	V _{CC}	DISABLE	V _{CC}	V _{CC}	NC
Pin	20	19	18	17	16	15	14	13	12	11
	LATCH†	BFM(+)	V _{CC}	BFM(-)	DATA(+)	DATA(-)	V _{EE}	CLOCK (+)†	V _{CC}	CLOCK (-)†

† Optional: if CLOCK (+) and CLOCK (-) inputs are not used, PIN 11, PIN 13, and PIN 20 can be left open. In this case, the module is pin compatible to its lower data rate (OC-3, OC-12, and OC-24) versions.

Safety

Laser Compliance Statement

The OPT3445-5.0 is classified as a:

- Class 1 Laser Product
- Laser Klasse 1
- Luokan 1 Laser laite
- Appareil A Laser De Classe 1
- Klass 1 Laser Apparat.

The OPT3445-5.0 is certified in the U.S. to conform to the requirements of the Department of Health & Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J of the FDA for Class 1 Laser Products.

 Caution - use of device other than those specified herein may result in hazardous laser radiation exposure. Please embrace all customary precautions & discretion while handling this device.

Optical	<ul style="list-style-type: none">• Avoid direct eye exposure to laser beam projection area or a broken fiber under operation.
Electrical	<ul style="list-style-type: none">• Warning against overvoltages or current surges as these may cause failure, electrical shock or fire.• Solder leads to electronics entirely so as to eschew short circuits.• Solder or plug in device while power is turned off.
Other	<ul style="list-style-type: none">• Avoid storage above maximum temperature rating & other extreme conditions.• Avoid device disassembly as damages may be incurred.• Avoid excessive force to fiber pigtail and bending beyond a 20 mm radius.• Take normal handling precautions as for all electrostatic sensitive devices.

Appendix

Terms

BFM: indicates the laser output power

LBM: indicates the total amount of dc current supplied to the laser

NC: not connected

Additional Information

Contact

For additional information, product specifications, or information about Optocom:

Internet: <http://www.optocom.com>

Email: Info@optocom.com

Tel: +1 978 988 8711

Fax: +1 978 988 8722

©2005 Optocom Corporation. All rights reserved. Reproduction in whole or in part is prohibited without prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract and is believed to be accurate and reliable and may be subjected to change without notice. No liability will be accepted by the publisher for any consequence of its use.