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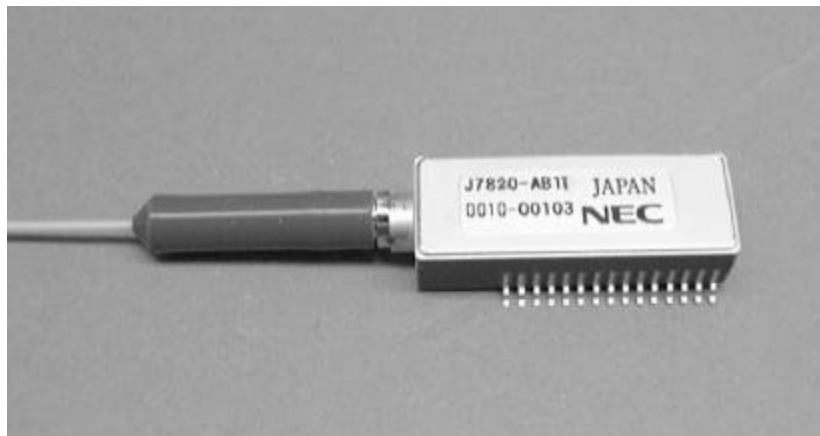
622.08Mbps Transmitter

OD-J7820-0B*1

OC-12 LR-1 / STM-4 L-4.1

OD-J7820-AB*1

OC-12 LR-2 and LR-3 / STM-4 L-4.2 and L-4.2



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1. Product number

Specifications	Product number	Optical connector
SONET OC-12 LR-1 and ITU-T G. 957 L-4.1	OD-J7820-0B11	SC
	OD-J7820-0B21	MUJ
	OD-J7820-0B31	FC
SONET OC-12 L-4.1 and ITU-T G. 957 L-4.2 and L-4.3	OD-J7820-AB11	SC
	OD-J7820-AB21	MUJ
	OD-J7820-AB31	FC

Note: Please make sure the products number. Product number depends on optical connector.

2. Specifications

(1) Absolute Maximum Ratings

Parameters	Specifications		Unit	Notes
	Min.	Max.		
Power supply voltage (Vcc)	-0.3	+6.0	V	
Storage temperature	-40	+85	deg. C.	Case temperature
Input pins	0	Vcc	V	

Stresses beyond these listed parameters may cause permanent damage to the device.

(2) Environmental Conditions

Items	Specifications	Unit	Notes
Bit rate	622.08	Mbps	
Data format	Scrambled NRZ	-	Scrambler is not included.
Transmission cable	Single mode fiber	-	SI-10/125
Operating temperature	0 to 65	deg. C.	Case temperature
Power supply voltage	+3.3 $\pm$ 5%	V	
Power consumption	0.4 (typical)	W	Under 25 deg. C., +3.3V
	0.7 (maximum)	W	Under worst condition
Package size	10 $\times$ 27 $\times$ 7	mm ³	Refer to page 9

(3) Optical Signal Interface Specifications

Items	Specifications		Unit	Notes
	Min.	Max.		
Optical output power (Average)	-3	+2	dBm	
Extinction ratio	10	-	dB	
Operating wavelength range	1280	1335	nm	OD-J7820-0B*1
	1480	1580	nm	OD-J7820-AB*1
Spectral width(-20dB width)	-	1	nm	
Side mode suppression ratio	30	-	dB	
Optical output waveform	Mask spec.		-	Refer to fig. 1
Laser diode class	IEC 825-2 class 1 compliant		-	

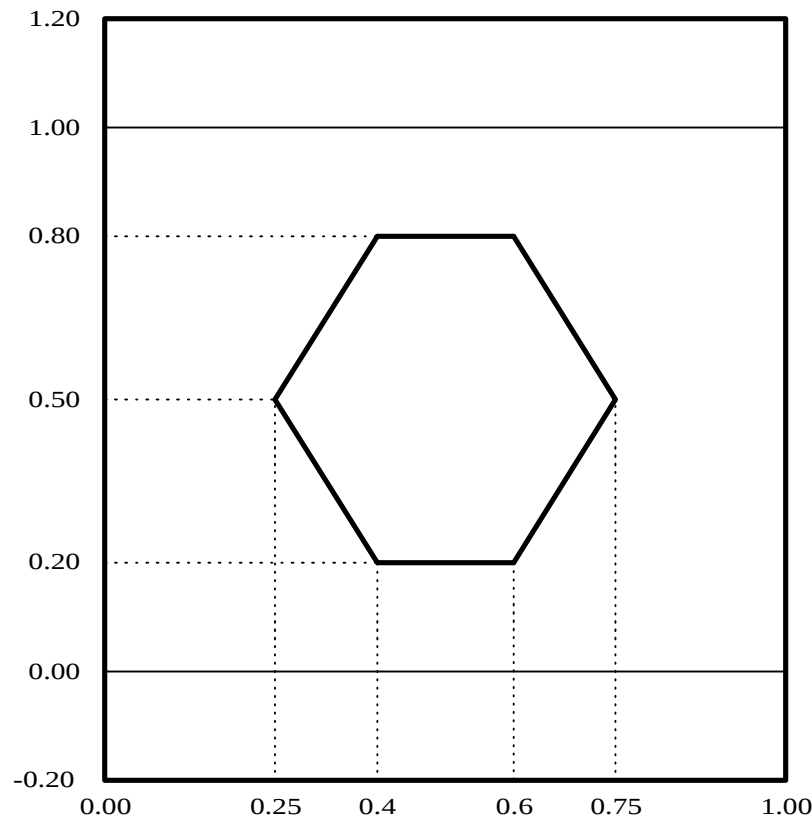
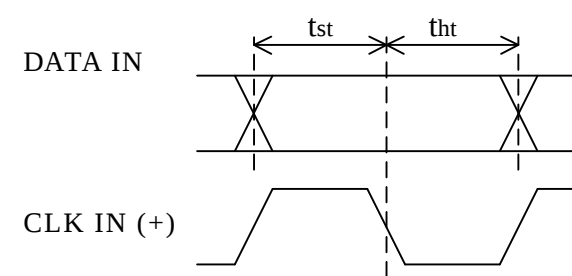


Fig. 1 Optical output signal mask specifications of SONET/ITU standard specified by the waveform after passing through a 4th order Bessel filter which has cut-off frequency of 622.08MHz $\times$ 0.75.

(4) Electrical Interface Specifications

4.1 Data and clock signal

Items	Specifications			Unit	Notes
Input signal Level		Min.	Max.	V	
	V _{IH}	$V_{CC} - 1.17$	$V_{CC} - 0.81$		
	V _{IL}	$V_{CC} - 1.84$	$V_{CC} - 1.48$		
Data and clock signal	 tst, tht < 200ps			-	

4.2 Alarm output (OPT OUT ALM, CURR ALM)

Items	Specifications			Unit	Notes
Output level		Min.	Max.	V	LV-CMOS
	VOH	$0.9 \times V_{CC}$	V_{CC}		
	VOL	0	$0.1 \times V_{CC}$		
Status	L	While alarm detected		-	
	H	While alarm not detected			
Fan-out	IOH	-0.2		mA	
	IOL	0.2			

4.3 Control input (SHUT DOWN)

Items	Specifications			Unit	Notes
Input level		Min.	Max.	V	LV-CMOS
	V _{IH}	2.0	V _{CC}		
	V _{IL}	0	0.8		
Status	L	Optical output disable		-	
	H	Optical output enable			

4.4 Control input (CURR ALM TST)

Items	Specifications	Notes
Status	CURR ALM will be asserted when connected to GND.	
	Leave open during normal operation	

4.5 Control input (FF SEL)

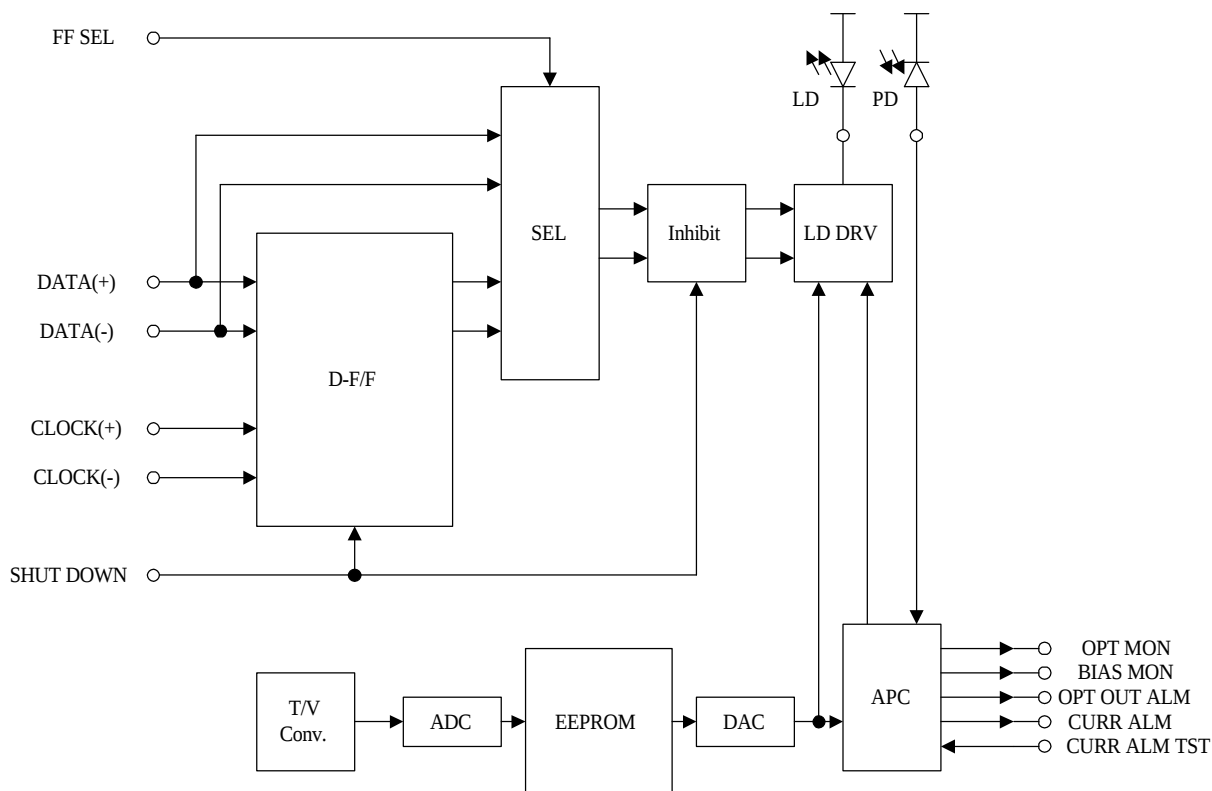
Items	Specifications	Notes
Status	When connected to GND, CLK IN signals have to be used.	Refer to Functional Block Diagram
	When left open, CLK IN signals don't be needed.	

4.6 Performance monitor

Items	Specifications	Notes
OPT MON	Voltage output: 550 mV (max.)	Receive with high impedance (1M ohms).
BIAS MON	Voltage output: $42 \times I_b$	Laser bias compensation current monitor. Receive with high impedance (1M ohms). I_b : Laser bias compensation current

3. Functional Block Diagram

(1) Functional Block Diagram



D-F/F: D flip-flop, LD DRV: Laser diode driver, DAC: Digital to analogue converter, T/V Conv.: Temperature to voltage converter, APC: Automatic power control circuit, ADC: Analogue to digital converter, EEPROM: Electronic erasable ROM, PD: PIN photo diode, LD: 1.31um Fabri-Pelot laser diode

(2) Alarm, monitor and control function

Items	Symbol	Function
Optical output power loss alarm	OPT OUT ALM	Active in loss of power condition. Does not assert until power degraded exceed 3 dB. Active 'L'
Laser degrade alarm	CURR ALM	Laser degradation alarm. Alarm asserts when laser bias compensation current increases by 25 mA $\pm$ 5 mA from the initial value.
Laser shut down	SHUT DOWN	Shutdown laser output. Active 'L'
Current alarm test	CURR ALM TST	Test CURR ALM function. When connected to GND, CURR ALM is forced to active.
Laser bias current Monitor	BIAS MON	Laser bias compensation current (Ib) monitor. The Ib is calculated from output voltage (Vo) of this terminal; $I_b = V_o / 42 \text{ mA}$. Initial value is nearly 0 V.
Optical output power monitor	OPT MON	Voltage output proportional to optical launch power of the transmitter.

4. Reliability

(1) FIT Number

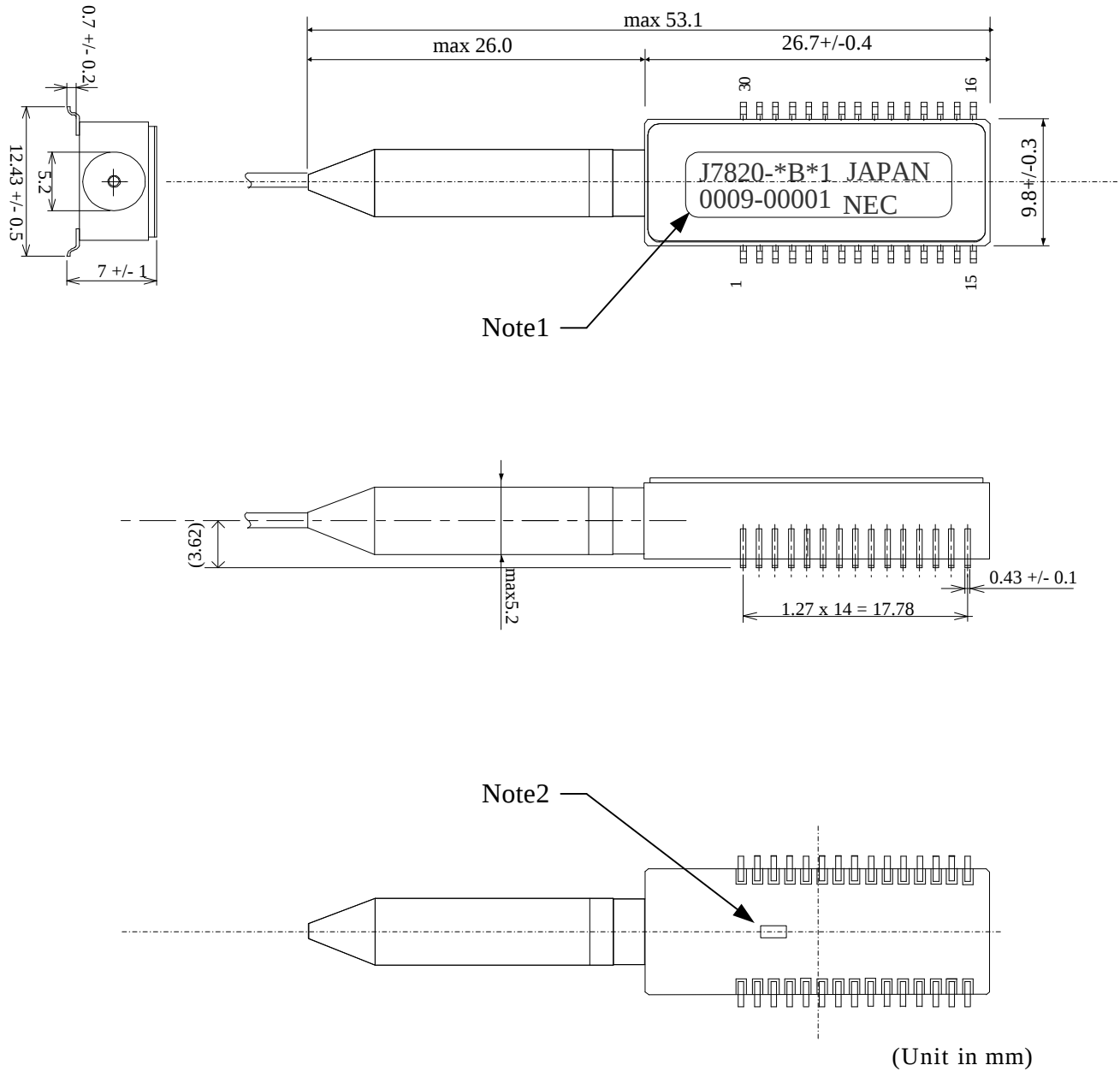
1500 FIT at 45 deg. C.

(2) Reliability Test Items and Conditions

Items	Conditions
Accelerated aging	85 degree C., 3.465 V, 5000 hours
Temperature cycle	-40 to 85 degree C., 4 H/cycle, 500 cycles
Damp heat	85 degree C., 85%RH, 500 hours
Vibration	10 to 55 Hz, 1.5 mm, x, y, z each direction, an hour
Mechanical shock	50 G, 11 ms, x, y, z each direction, 3times
Thermal shock	0 and 100 degree C. in water, 5 min. each, 20 cycles
Low temperature storage	-40 degree C., 2000 hours

5. Package size, Pin Assignment

(1) Outline diagram, Pin layout



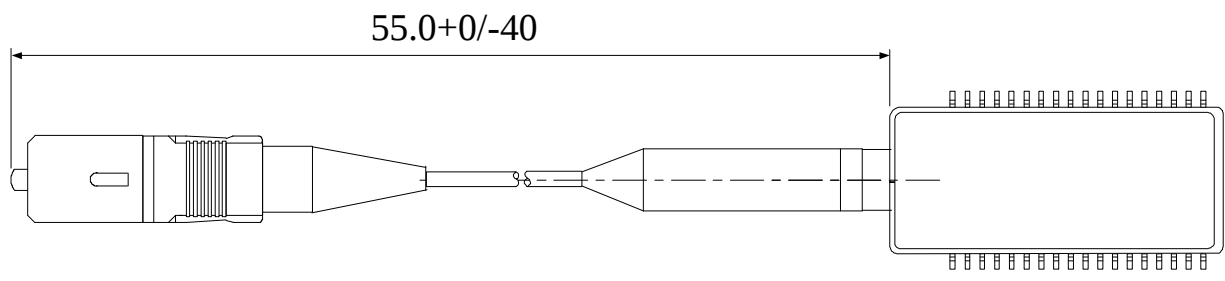
(Unit in mm)

Note1 Product name description is given below:

NEC:	NEC logo mark
J7820-*B*1:	Product Number
****_****:	Production year/month-serial no.

Note 2 Product testing terminal; keep open; do not connect to any other pattern or GND

(2) Outline diagram, Fiber length



(Unit in mm)

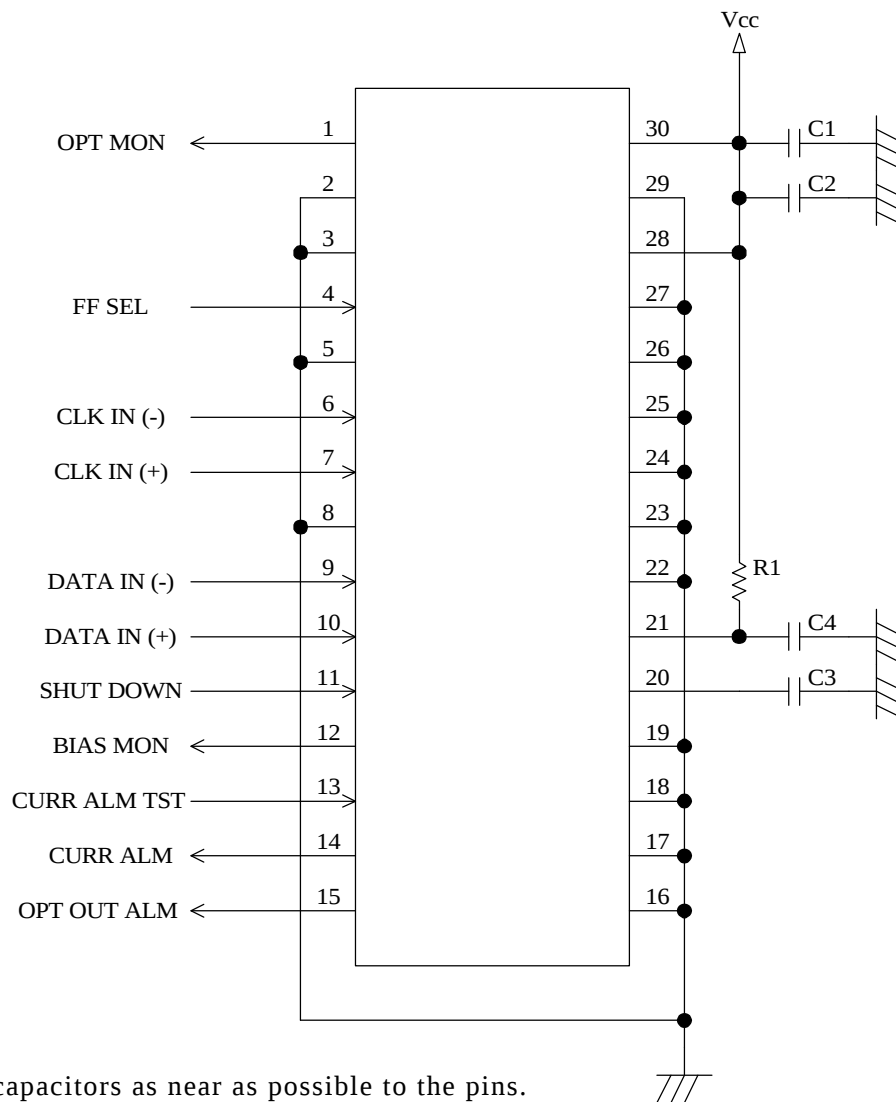
(3) Pin Assignment

Pin No.	Symbol	I/O	Notes
1	OPT MON	O	Refer to page 6, 7
2	GND	I	
3	GND	I	
4	FF SEL	I	Refer to page 6, 7
5	GND	I	
6	CLK IN (-)	I	Refer to page 5, 7
7	CLK IN (+)	I	Refer to page 5, 7
8	GND	I	
9	DATA IN (-)	I	Refer to page 5, 7
10	DATA IN (+)	I	Refer to page 5, 7
11	SHUT DOWN	I	Refer to page 5, 7
12	BIAS MON	O	Refer to page 6, 7
13	CURR ALM TST	I	Refer to page 5, 7
14	CURR ALM	O	Refer to page 5, 7
15	OPT OUT ALM	O	Refer to page 5, 7
16	GND	I	
17	GND	I	
18	GND	I	
19	GND	I	
20	EXT C	-	Connect a 0.1uF capacitor with GND. Refer to next page
21	Vcc	I	Refer to next page
22	GND	I	
23	GND	I	
24	GND	I	
25	GND	I	
26	GND	I	
27	GND	I	
28	Vcc	I	Refer to next page
29	GND	I	
30	Vcc	I	Refer to next page

I: input terminal, O: output terminal

6. Recommended peripheral circuit

For this product, it is necessary to use the recommended circuit shown below:



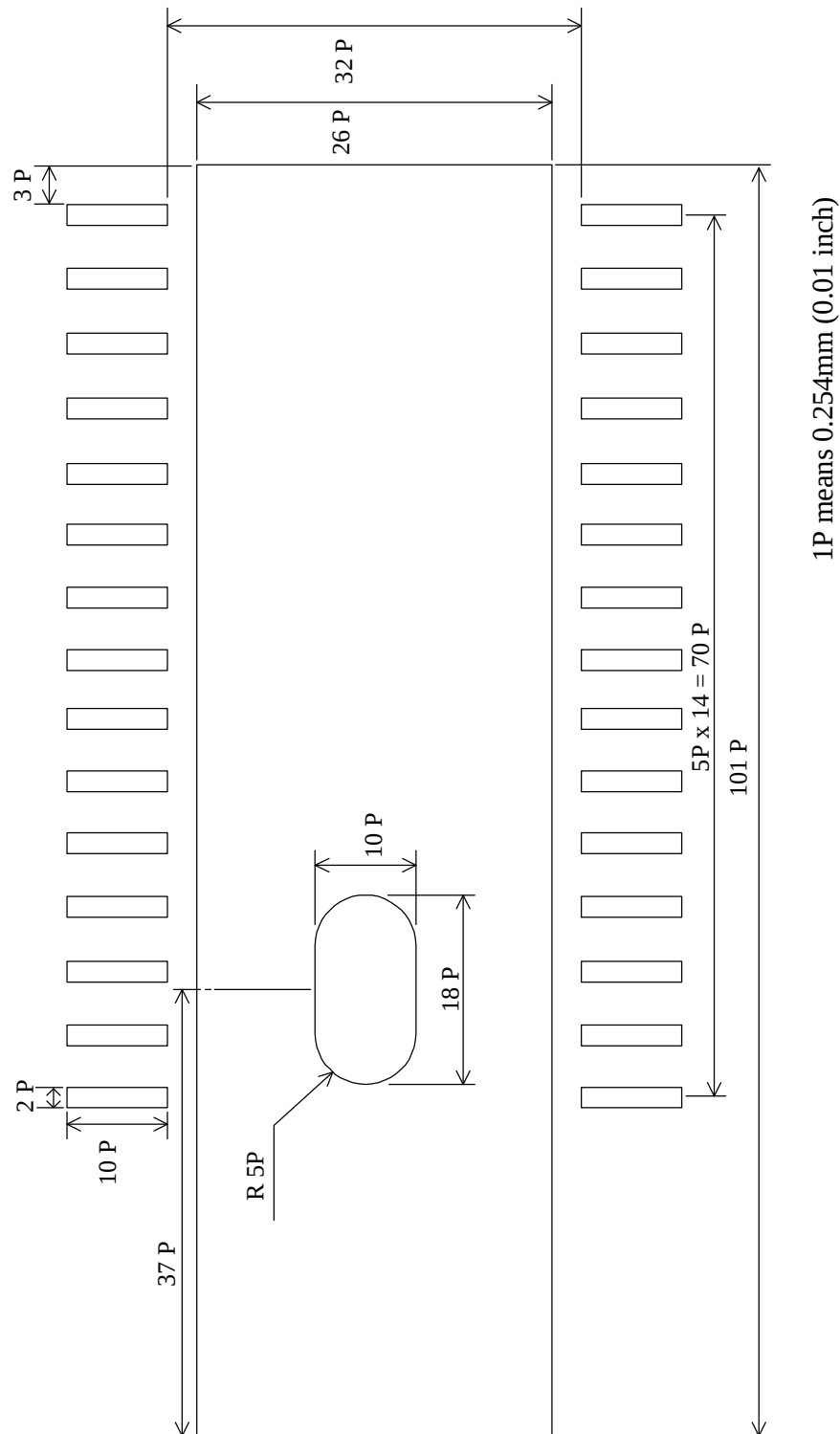
Connect Vcc capacitors as near as possible to the pins.

Fig. 2 Recommended peripheral circuit

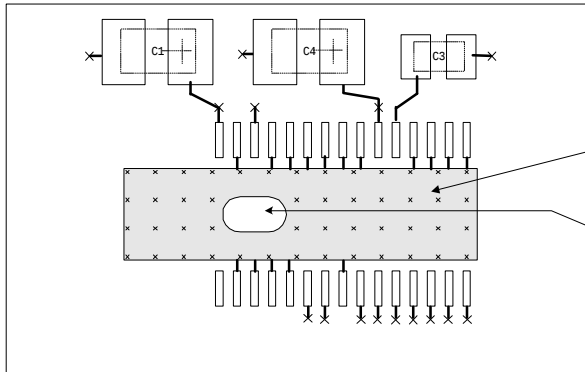
Peripheral circuit part list

Symbol	Description
R1	10 ohm, 1/16 W
C1	10 uF +/-20%, 10V Tantalum capacitor
C2	0.1 uF, +20% / -80 %, 10V Ceramic capacitor
C3	0.1 uF, +/-20%, Ceramic capacitor
C4	10 uF +/-20%, 10V Tantalum capacitor

7. Pad layout



8. Recommended pattern layout

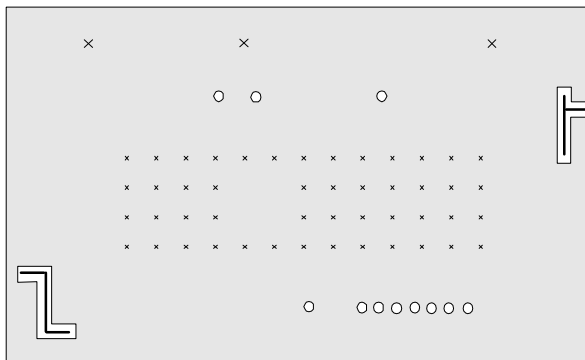


First Layer (Component side)

Keep GND pattern under module's bottom surface and connect densely with GND patterns of other layers by through holes.
(In case of OD6502-HB01, keep it without resist and re-flow solder it with PCB GND)

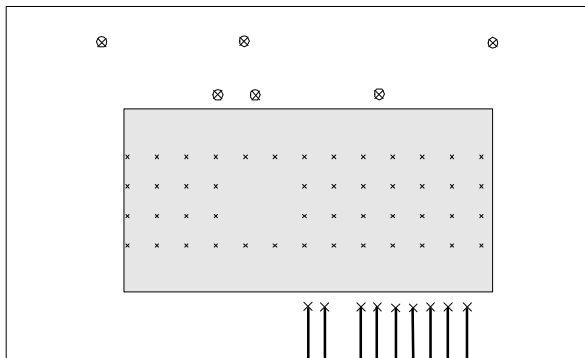
Don't put GND pattern and through holes in this area.

Make blank area GND



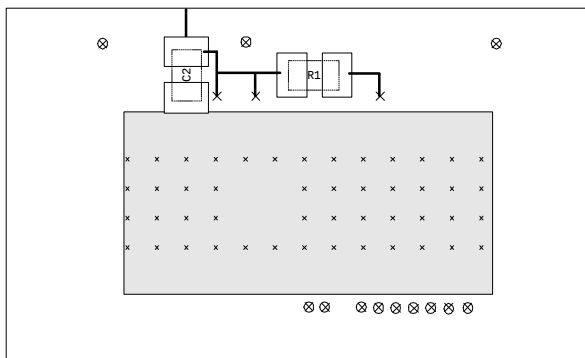
Second Layer (Ground layer)

x: through holes



Third Layer (Power Supply layer)
Make blank area GND

x: through holes



Fourth Layer (Signal and solderside)

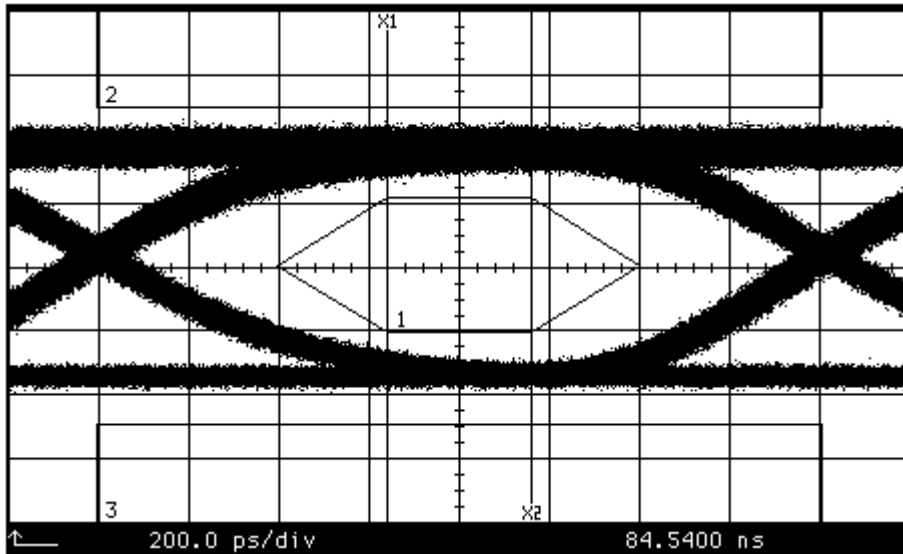
keep high frequency signal patterns as short as possible, and do not cross with power supply patterns.

Make blank area GND

x: through holes

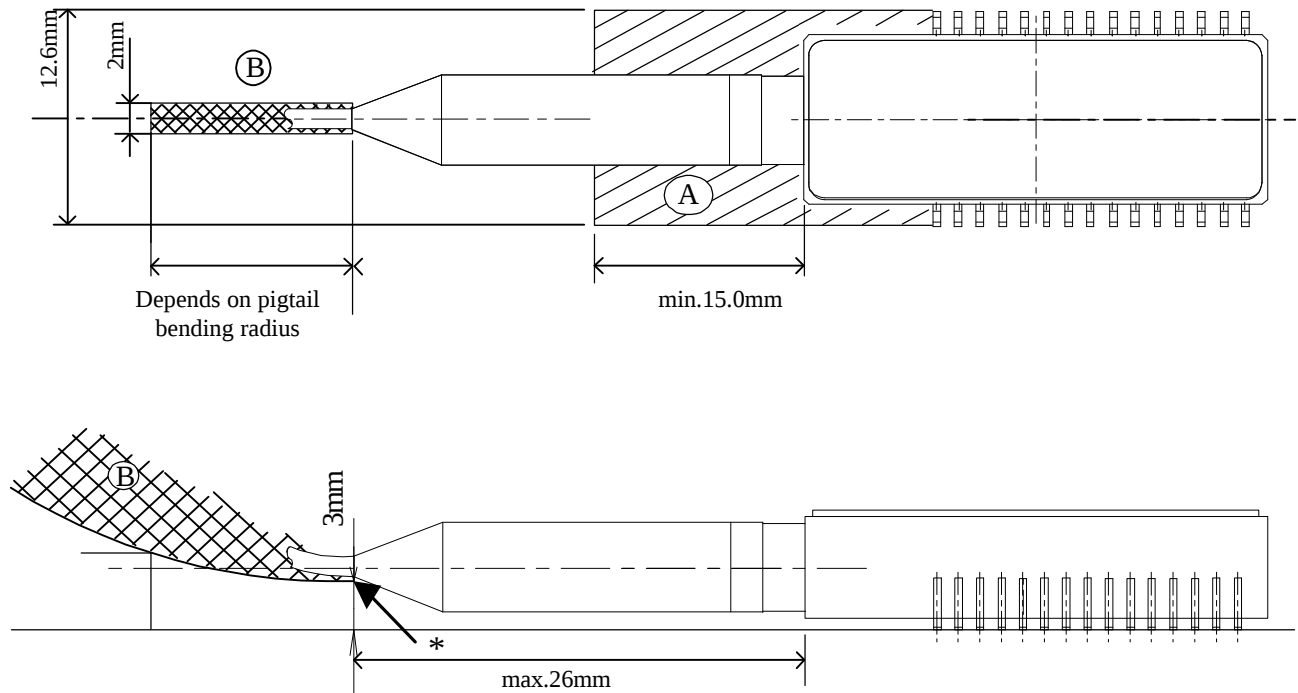
9. Typical operating characteristics

(1) Optical output waveform (200 ps/div., 25 deg. C)



10. Recommended Mounting Conditions

(1) Mount prohibit area



Un-mountable Area

- 1) "A" is necessary space for the pigtail-connecting tool for OD-J6860. Keep this area empty, in case of OD-J6860 will be mounted on the PCB for OD-J7820. Pin layout of OD-J6860 and OD-J7820 are same.
OD-J6860 is for SONET OC-12 SR / ITU-T G.957 STM-4 S1.1 compliant.
- 2) "B" is space for pigtail cord; keep the bending radius of pigtail cord more than 30mm.
- 3) Start bending pigtail cord after "*" this point.

(2) Soldering Conditions

- 1) Soldering iron temperature: Less than 260 deg.C.
- 2) Soldering time per pin: Less than 5 second
- 3) Environment for soldering: Room temperature

Caution:

- 1) Please connect soldering iron to the earth ground
- 2) Be careful the pigtail fiber to touch the soldering iron

(3) Solvent Cleaning

Solvent cleaning is prohibited.

(4) De-soldering from the Printed Board

The product performance is not guaranteed in case of de-soldering from a printed circuit board.

(5) Shipment Packing

Under consideration

11. Application Precautions

(1) Optical Connector Precautions

The optical connector should be kept free from dust, and the optical connector cap should be kept in place as a dust cover when the device is not connected to a cable.

If contamination is present on the optical connector, the use of canned air with an extension tube should remove any loose debris.

(2) Optical Fiber Precautions

Do not stretch or bend pigtail cord more than specified values. Recommended value for stretch is less than 200gf and bending radius should be more than 30 mm.

Do not step on the pigtail cord, Do not put a thing on the pigtail cord.

(3) Other Precautions

In this product, optical parts are mounted on a ceramic package. Mechanical shocks due to falling could lead to permanent damage to the product.

The product's performance given in this manual is guaranteed for correct applications only. In case of incorrect usage product performance is not guaranteed.

Sudden heating and sudden cooling by dryer and cooling spray could lead to permanent damage to the product. The product may not operate correctly while sudden heating and/or sudden cooling.

This product should be handled as a CMOS product.

Unterminated optical connector may emit laser radiation. Do not view with optical instruments.

Do not disconnect the optical connector under operating.