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Hitachi Cable

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PRODUCT DATA SHEET
SFF TRANSCEIVER
for SONET/SDH

HTR6545 Series
for OC-48 SR (up to 2km)



Features

- SONET OC-48 SR (2.5Gbit/s, 2km) compliant.
- Fully comply with industry standard 2x10pin Small Form Factor transceiver with LD, PD monitor functions, without clock recovery.
- LC duplex receptacle.
- +3.3V single power supply.
- Low power consumption (0.5W(typ.)).

1. General

This document specifies the characteristics of the Small Form Factor optical transceiver (Type:HTR6545) with LC duplex receptacle for an OC-48 Short Reach interface (SR, up to 2km).

2. Function

This transceiver is powered from a single +3.3V power supply and operated at a data rate of 2488.32Mbps(NRZ). Optical output power is held constant by automatic power control over the specified operating temperature and voltage ranges. Electrical data inputs and outputs have CML logic level.

The optical output is disabled by a TTL logic level input for that purpose.

A signal Detect (SD) output is provided to indicate the presence of an incoming optical signal. SD is a TTL compliant signal. Received optical power, laser bias current and laser monitor current can be monitored using pins for that purpose.

Dimensions and pin assignment fully comply with MSA (Multi Source Agreement) for 2 by 10 type optical transceiver.

3. Absolute Maximum Ratings

Stresses in excess of the ratings listed in Table 1 can cause permanent damage to the device and affect device reliability. Functional operation of the device is not implied at any condition in excess of those given in the operating specification.

Table 1. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{CC}	0	4.0	V
Data Input Voltage	V_{IN}	V_{EE}	$V_{CC}+0.3$	V
Operating Ambient Temperature	T_A	0	70	deg-C
Storage Case Temperature	T_{stg}	-40	85	deg-C
Lead Soldering Temperature/Time	-	-	250/10	deg-C / s
Operating Relative Humidity (non-condensing)	H_A	5	85	%

4. Optical and Electrical Characteristics of Transmitter Portion

Optical and electrical characteristics of transmitter portion are shown in Table 2. Unless otherwise stated, minimum and maximum values are specified over the operating ambient temperature, and humidity ranges, DC power supply voltage range, from beginning to end of life, using 2^{23} -1 pseudo random bit stream with a 50% duty factor.

The logic sense for the DATA input is such that a logic “1”(High) corresponds to the maximum level of an amplitude modulated light source (Light on), while a logic “0”(Low) corresponds to a minimum level of an amplitude modulated light source (Light off).

Table 2. Transmitter Optical and Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Optical Output Power	P _o	-10	-	-3	dBm
Center Wavelength	λ	1266	-	1360	nm
Spectral Width(RMS)	$\Delta\lambda$	-	-	4.0	nm
SONET Eye Mask	-	compliant with GR253 spec.			-
Extinction Ratio	-	8.2	-	-	dB
DC Power Supply Voltage	V _{cc}	3.135	3.3	3.465	V
DC Power Supply Current	I _{cc}	-	-	100	mA
Data Input Voltage					
Input V Range	V _{IA} , V _{IB}	V _{CC} -1.2	-	V _{CC} +0.2	V
Common Mode Input V	V _{CI}	-	V _{CC} -0.2	-	V
Diff'l Input Swing	V _{ID SWING}	300	-	1200	mV _{p-p}
Diff'l Input Impedance	Z _{ID}	85	100	115	ohm
Tx Disable Voltage	V _D	V _{cc} -1.3	-	V _{cc}	V
Tx Enable Voltage	V _{EN}	V _{EE}	-	V _{EE} +0.8	V

5. Optical and Electrical Characteristics of Receiver Portion

Optical and electrical characteristics of receiver portion are shown in Table 3. Unless otherwise stated, minimum and maximum values are specified over the operating ambient temperature, and humidity ranges, DC power supply voltage range and wavelength range, from beginning to end of life, using a 2^{23} -1 pseudo random bit stream with a 50% duty factor.

Table 3. Receiver Optical and Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Optical input Power (Average) ^a	P_{IN}	-18	-	-3	dBm
Signal Detect Threshold:					
Decreasing Light Input	SDT_D	-28	-	-18	dBm
Increasing Light Input	SDT_I	-	-	-18	dBm
Hysteresis	SDT_H	0.5	-	6	dB
DC Power Supply Voltage	V_{CC}	3.135	-	3.465	V
DC Power Supply Current	I_{CC}	-	-	80	mA
Data Output Voltage: ^b					
Output V	V_{OA}, V_{OB}	$V_{CC}-0.5$	-	V_{CC}	V
Diff'l Output Swing	$V_{OD\ SWING}$	640	800	1000	mV _{p-p}
Output Offset V	V_{CO}	-	$V_{CC}-0.2$	-	V
Diff'l Output Impedance	V_{OD}	85	100	115	ohm
Output Transition Time ^c	t_o	-	-	150	ps
Signal Detect Output Voltage: ^d					
Low	V_{OL}	-	-	0.4	V
High	V_{OH}	$V_{CC}-0.9$	-	-	V
Signal Detect Response Time:					
Decreasing Light Input	$SDRT_D$	-	-	300	us
Increasing Light Input	$SDRT_I$	-	-	100	us

a. At a BER of 1×10^{-10} and an extinction ratio of 8.2dB

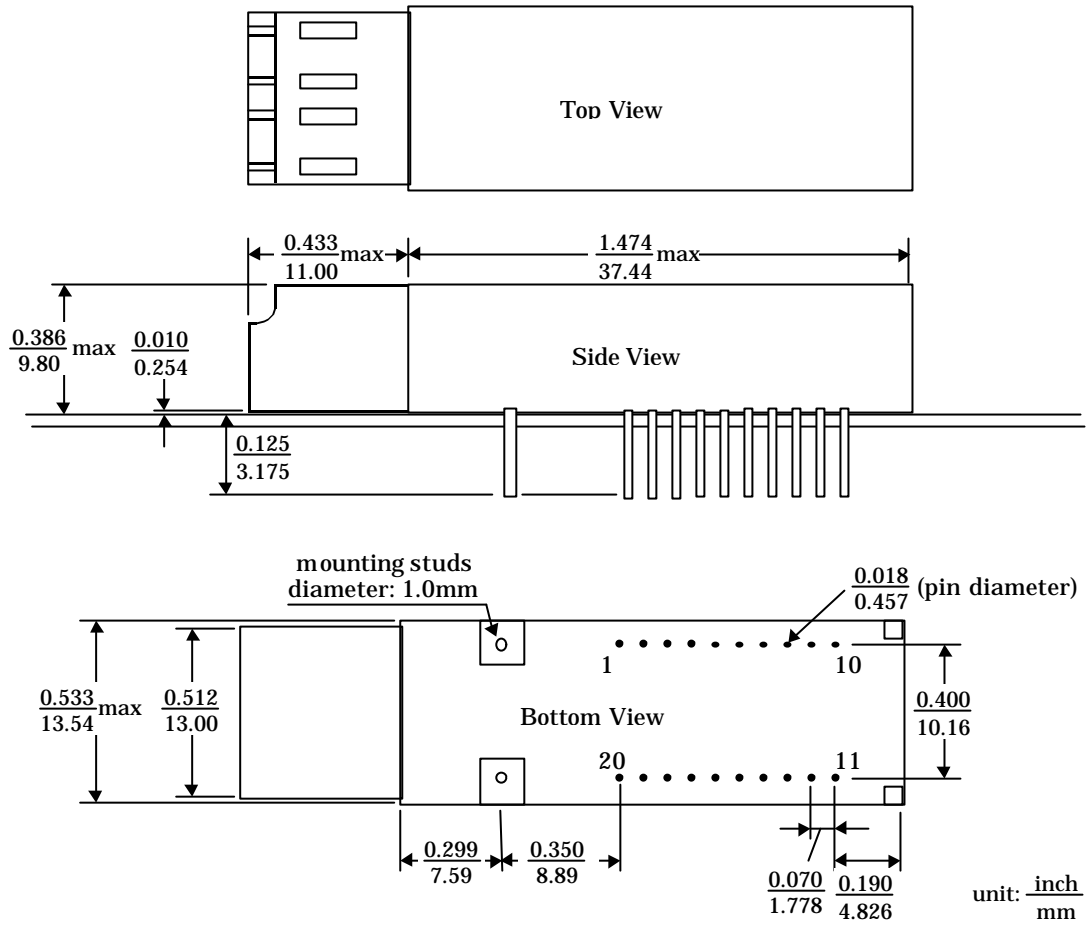
b. CML compatible, R_L is 50 ohm to V_{CC} .

c. Between 20% and 80% (50% duty cycle)

d. TTL compatible.

6. Physical Design

The outline for transceiver package is shown in Figure 1.



Unless otherwise stated, typical values are shown

Figure 1. Package Outline

Pin 1 (RMON) could be used for received power monitoring. Equivalent internal circuit of RMON is shown in Figure 3. RMON should be connected to VCC via sensing resistor: R_s (R_s is recommended less than 150ohm.). Typical response coefficient of the PD is 0.85 A/W. If this function is not used, connect this pin to VCC directly.

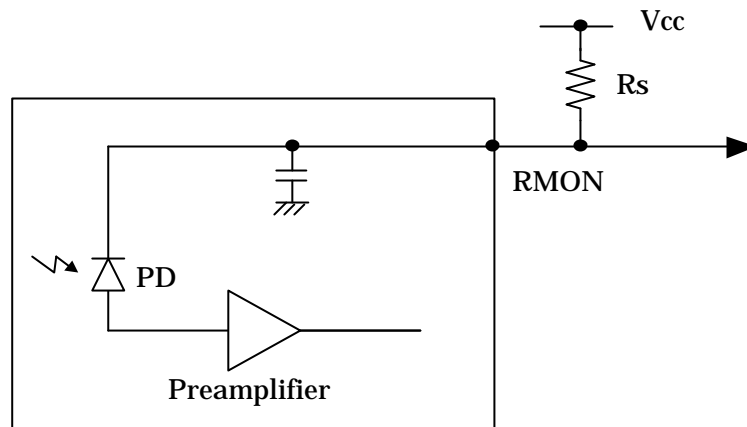


Figure 3. Equivalent internal Circuit of RMON

8. Inspection

Inspection items are as follows:

- (1) Appearance
- (2) Dimensions
- (3) Optical output power
- (4) Optical waveform
- (5) Optical input power
 - a) Average Sensitivity
 - b) Signal Detect / Decreasing Light Input
 - c) Signal Detect / Increasing Light Input
- (6) Power supply current

9. Packing

The optical transceiver shall be packed in sturdy carton box(es) when shipping.

10. Caution

- (1) Do not stare into optical output port although this product is designed to meet the class 1 laser regulation.
- (2) The housing of the transceiver is possible to crack or dissolve against the particular chemicals. Although we recommend to use the aqueous fluid in the cleaning, the below chemicals are checked not to affect to the housing. Pay attention in the solder flux and cleaning process. We recommend checking the appropriateness of the cleaning fluid in advance.

/ methyl alcohol, ethyl alcohol, butyl alcohol, isopropyl alcohol, hexane, cyclohexane, naphtha, tetrachloroethylene, propylene glycol,

< Do not use : Chemicals which are checked to crack or dissolve >

/ trichloroethylene, trichloroethane, benzen, methyl ethyl ketone, chloroform, toluene, acetone, phenol, ethyl acetate, methylene di chloride, isophtalic acid dimethyl ester

- (3) Optical connectors should be cleaned completely by proper cleaning process before insertion to optical receptacles of the transceiver to avoid contamination inside the optical receptacle. The contamination may cause serious degradation of transmission performance. Using forced nitrogen and some kind of cleaning stick ("CLETOP, stick type" for LC/MU connector supplied by NTT international is recommended) should be used if the receptacle get contaminated by miss-treating optical connectors.

11. Recommended Circuit

Recommended decoupling and termination for HTR6545 is illustrated in Figure 4 . This recommendation will provide a good performance of the optical transceiver.

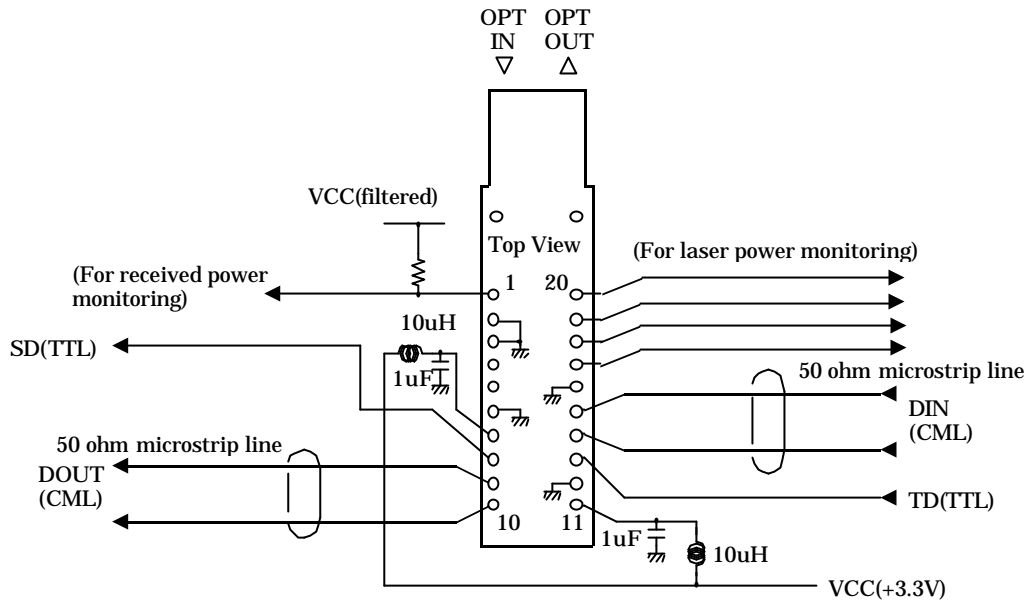
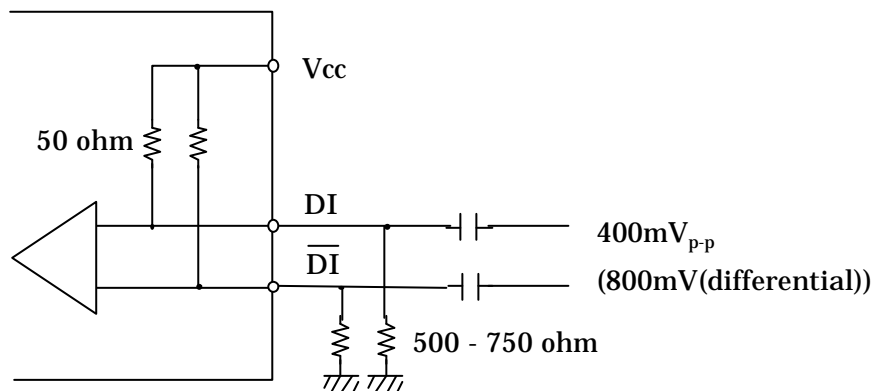


Figure 4. Recommended decoupling and termination


Remark : HTR6545 has input termination resistors (50 ohms to Vcc) inside the package. If AC coupling is needed, place bias resistors outside the package to prevent the input signal voltage from exceeding Vcc.



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