155Mbps S/M WDM
Bi-directional Transceiver(WBM™,WBR™)

REV. A/03/2003

Single Mode WDM Bi-directional Transceiver
For 10/100 Base Ethernet, PON, SONET/OC-3, SDH/STM-1

The Bi-directional optical transceiver is designed for single mode fiber and operates at a wavelength of 1310nm/1550nm transmitting(InGaAsP MQW FP Laser) and receiving (PIN photodiode) function for 10/100Base Ethernet, PON(Passive Optical Network), FTTC(Fiber To The Curb) and FTTH(Fiber To The Home) applications.

This Module incorporates high performance, reliable optical devices and is proven circuit technology to give long life and consistent service and is provided high speed PECL differential interface for input and output.

This Module style is recognized as a Mezzanine standard 1x9 package with SC Single fiber optic connector and this module is a class 1 laser product complying with FDA Radiation Performance Standards with IEC825-1.

Features

- **Up to 155Mbps applications (10/100 Base Ethernet, PON, SONET/OC-3 and SDH/STM-1)**
- **Designed for short or long reach application**
- **Integrated 1310/1550nm WDM for a single fiber**
- **InGaAsP MQW FP(Fabry Perot) or DFB Laser Diode**
- **High Sensitivity InGaAs PIN photodiode**
- **Single +3.3V or +5V Power Supply**
- **PECL compatible data input & output logic levels**
- **Industry Standard 1 x 9 Foot-print with integral SC Single fiber connector(PCI Mezzanine Card compliant package)**
- **Eye safety shutter (WBR™)**

Absolute Maximum Ratings

Stress beyond those under "Absolute Ratings" may cause permanent damage to the module. These are stress ratings only and functional operation of the module at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum conditions for extended periods may affect the module Reliability.

Parameter		Symbol	Min	Max	Units
Storage Temperature		T_{stg}	-40	+85	°C
Operating Temperature	+3.3V +5.0V	T_{op}	-40 0	+85 +70	°C
Lead Soldering Temperature		T_s		240	°C
Lead Soldering Time		t_s		10	S
Supply Voltage	+3.3V +5.0V	V_{CC}	0 0	3.6 5.5	V

Specifications

Operation Conditions

Parameter		Symbol	Min	Max	Units
Ambient Operating Temperature	+3.3V +5.0V	T_{op}	-40 0	+85 +70	°C
Operating Voltage	+3.3V +5.0V	V_{CC}	3.13 4.75	3.47 5.25	V

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Supply Current[1]	I_{CC}			200	mA
Transmitter					
Differential Input Data	V_{IH-IL}	300			mV
Input Data-Low	V_{IL}	V_{CC}-1.82		V_{CC}-1.62	V
Input Data-High	V_{IH}	V_{CC}-1.16		V_{CC}-0.89	V
Receiver					
Output Data-Low[2]	V_{OL}	V_{CC}-1.82		V_{CC}-1.62	V
Output Data-High[2]	V_{OH}	V_{CC}-1.16		V_{CC}-0.89	V
Signal Detect Output-Low[2]	V_{OL}-V_{CC}	V_{CC}-1.82		V_{CC}-1.62	V
Signal Detect Output-High[2]	V_{OH}-V_{CC}	V_{CC}-1.16		V_{CC}-0.89	V

Notes:
1. Input bias current and Output current are not included.
2. Compatible with PECL output

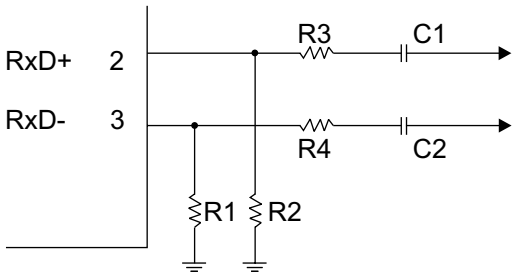
Optical Characteristics

Parameter		Symbol	Min	Typ	Max	Units
Transmitter						
Optical Transmit Power[1]	Short Haul Long Haul	P_{opt}	-15 -10		-7 -3	dBm
Center Wavelength		λ_C	1260 1500	1310 1550	1360 1600	nm
Spectral Width (RMS)[2]	1310nm FP 1550nm FP 1550nm DFB	$\Delta\lambda$			7.7 2.5 1.0	nm
Extinction Ratio[3]		E_R	9	10		dB
Data Rise/Fall Time[4]	155Mbps	t_R, t_F			1600	ps
Receiver						
Optical Sensitivity[5]		P_{MIN}			-33	dBm
Operating Wavelength		λ_O	1200		1600	nm
Optical Overload		P_{MAX}	-3			dBm
Signal Detect Alarm ON			-42		-33	dBm
Crosstalk[6]		CRT	-50		-40	dB

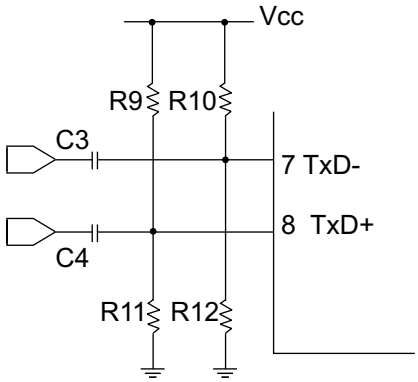
Notes:
Measured at the bit rate of 155.52Mbps, PRBS 2^{23}-1, NRZ
1. Transmit Power is set to -11±1dBm SH, -7±1dBm LH @ SOL and room temperature
2. CW, P_O = 5mW(1310nm), 3mW(1550nm) at TO CAN
3. Extinction Ratio is set to > 13dB @ SOL and room temperature
4. 20% to 80% values
5. Sensitivity is defined at a BER of $1x10^{-10}$, 2^{23}-1 PRBS
6. Crosstalk is defined as CRT = 10 x log(P_2/P_1).
   * P_1 = P_{opt} = 1mW (with no optical input power P_{port})
   * P_2 = the necessary optical input power P_{port} at I_C = 1310nm to get for P_{opt} = 0 the same receiver signal level as before

Recommendations

Data Input/Output



Data Output



Data Input

Values
R1/R2 = 270ohm(5V)
= 150ohm(3.3V)
R3/R4 = Short(PECL Interface)
= 25ohm(CML Interface)
= 50ohm(LVDS Interface)

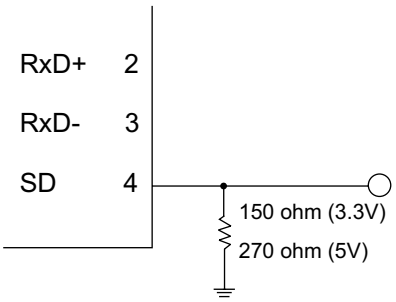
R9/R10= 82ohm(5V)
= 82ohm(3.3V)

R11/R12= 130ohm(5V)
=130ohm(3.3V)

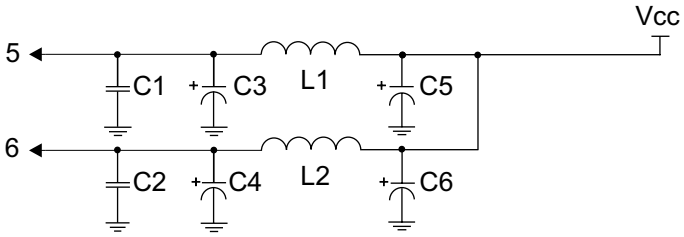
C3/C4= 100nF
C1/C2= 100nF

Signal Detect

The PECL output option of the signal detect line may be terminated a 50ohm resistor to a Vcc-2 volt source or the Thevenin equivalent in order to generate the correct voltage outputs.



Power Coupling



Values
C1/C2= 100nF Ceramic
C3/C4/C5/C6= 10uF Tantal
L1/L2=3.3uH Coil or Ferrite Inductor

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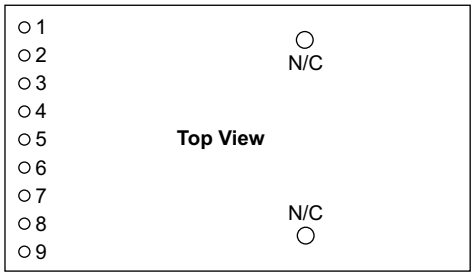
Pin Assignment



Pin.	Symbol	Descriptions
Pin 1	Rx_GND	Receiver Ground
Pin 2	RxD+	Receiver Data Out
Pin 3	RxD-	Receiver Data Out Bar
Pin 4	SD	Receiver signal detect output
Pin 5	Rx_Vcc	+3.3V or +5V Supply for single the Receiver section
Pin 6	Tx_Vcc	+3.3V or +5V Supply for single the Transmitter section
Pin 7	TxD-	Transmitter Data In Bar
Pin 8	TxD+	Transmitter Data In
Pin 9	Tx_GND	Transmitter Ground

Regulatory Compliance

Feature	Test Method	Performance
Laser Eye Safety	21 CFR(J) 1040.10 and 1040.11	CDRH Compliant and Class 1 Laser Safety product
Electromagnetic Interference	FCC part 15 Class A, C63.4: 2001	Compliant with Standard
	EN55022: 1998 Class A, EN610000-6-1: 2001, EN610000-6-3: 2001	

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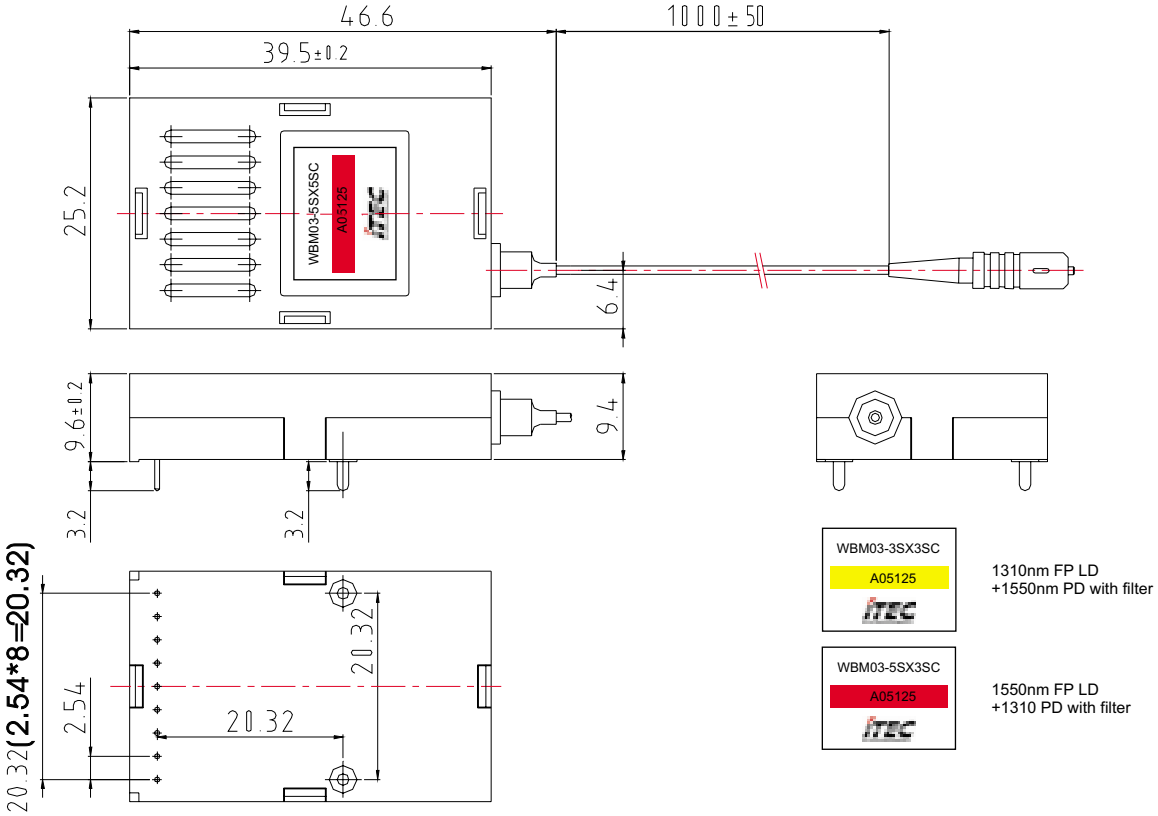
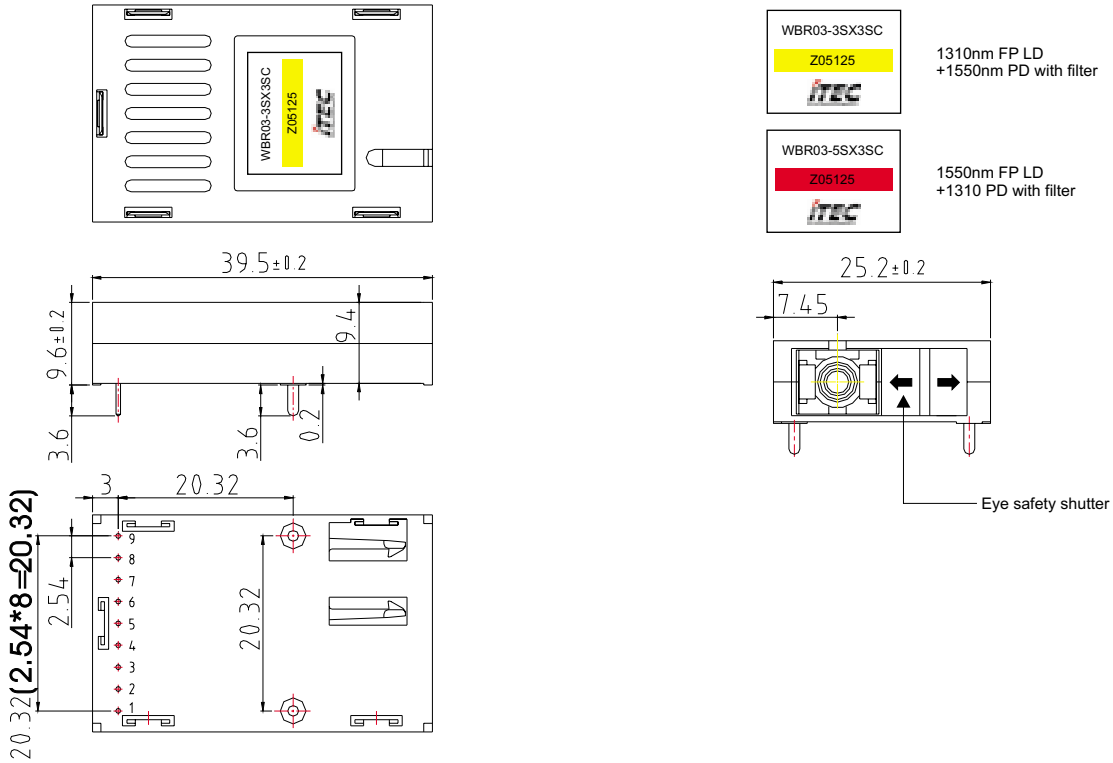
Dimensions

All dimensions are in millimeters. *Mezzanine standard

• WBM™(155Mbps S/M WDM Bidirectional Pigtail Transceiver Module)



• WBR™ (155Mbps S/M WDM Bidirectional Receptacle Transceiver Module)



Ordering Information

• WBM™(155Mbps S/M WDM Bi-directional Pigtail Transceiver Module)

			W	B	M	0	3	-	3	S	X	3	S	C

Product	WBM:WDM Bi-directional Pigtail Transceiver Module	
Application	03: 155Mbps(OC-3, STM-1)	
Source	3: 1310nm LD Source, 1x9 Footprint type 5: 1550nm LD Source, 1x9 Footprint type	
Device	Transmitter S: Short Haul 1310/1550nm FP LD	Receiver +1310 or 1550nm PIN-TIA with filter
Blank	X	
Power Supply	3: +3.3V 5: +5.0V	
Connector Type	SC: SC Connector	

• WBR™ (155Mbps S/M WDM Bi-directional Receptacle Transceiver Module)

			W	B	R	0	3	-	3	S	X	3	S	C

Product	WBR:WDM Bi-directional Receptacle Transceiver Module	
Application	03: 155Mbps(OC-3, STM-1)	
Source	3: 1310nm FP LD Source, 1x9 Footprint type 5: 1550nm FP LD Source, 1x9 Footprint type	
Device	Transmitter S: Short Haul 1310/1550nm FP LD L: Long Haul(Special)1310nm FP LD, 1550nm DFB LD	Receiver +1310 or 1550nm PIN-TIA with filter +1310 or 1550nm PIN-TIA with filter
Blank	X	
Power Supply	3: +3.3V 5: +5.0V	
Connector Type	SC: SC Connector	

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