RYTQB01

Features

- Operating data rate up to 28.05Gbps
- 850nm VCSEL Transmitter
- Distance up to 100m @50 / 125 um OM4
- Distance up to 70m @50 / 125 um OM3
- Single 3.3V Power supply
- Duplex LC Connector Interface, Hot Pluggable
- Built-in dual CDR
- Compliant with SFP28 Specification SFF-8402
- Power Dissipation < 1.2W
- Operating Case Temperature
  Standard: 0℃~+70℃

Applications

- Tri-Rate 8.5/14.025/28.05Gbps FC
- 32FC
- Other Optical Link

Product Description

The RYTQB01 series multi-mode transceiver is SFP28 module for duplex optical data communications up to 28.05Gb/s. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I^2C. It has built-in clock and data recovery (CDR). This module is designed for multi-mode fiber and operates at a nominal wavelength of 850 nm.

The transmitter section uses a Vertical Cavity Surface Emitted Laser (VCSEL) and is a Class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated GaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings*Note3

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC	-0.5	4.0	V

Note2: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.
Operating Case Temperature	TA	0		70
Power Supply Voltage	VCC	3.15		3.46
Power Supply Current	ICC			340

Performance Specifications Electrical

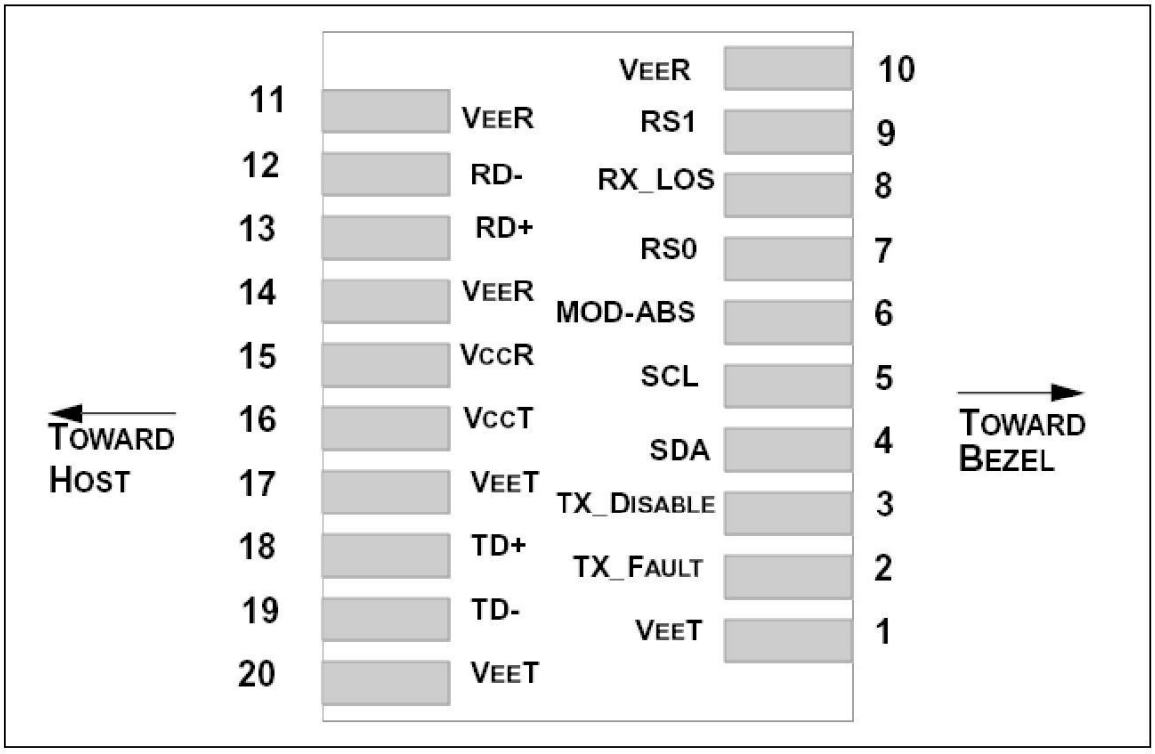
Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	Vin	150		980	mVpp	AC coupled inputs
Input Impedance (Differential)	Zin		100		ohms	Connected directly to TX pins
Tx_DISABLE Input Voltage – High		2		Vcc	V	
Tx_DISABLE Input Voltage – Low		0		0.8	V	
Receiver						
CML Outputs (Differential)	Vout	300		900	mVpp	AC coupled outputs
Rx_LOS Output Voltage – High		2		Vcc_Host	V	
Rx_LOS Output Voltage – Low		0		0.8	V	

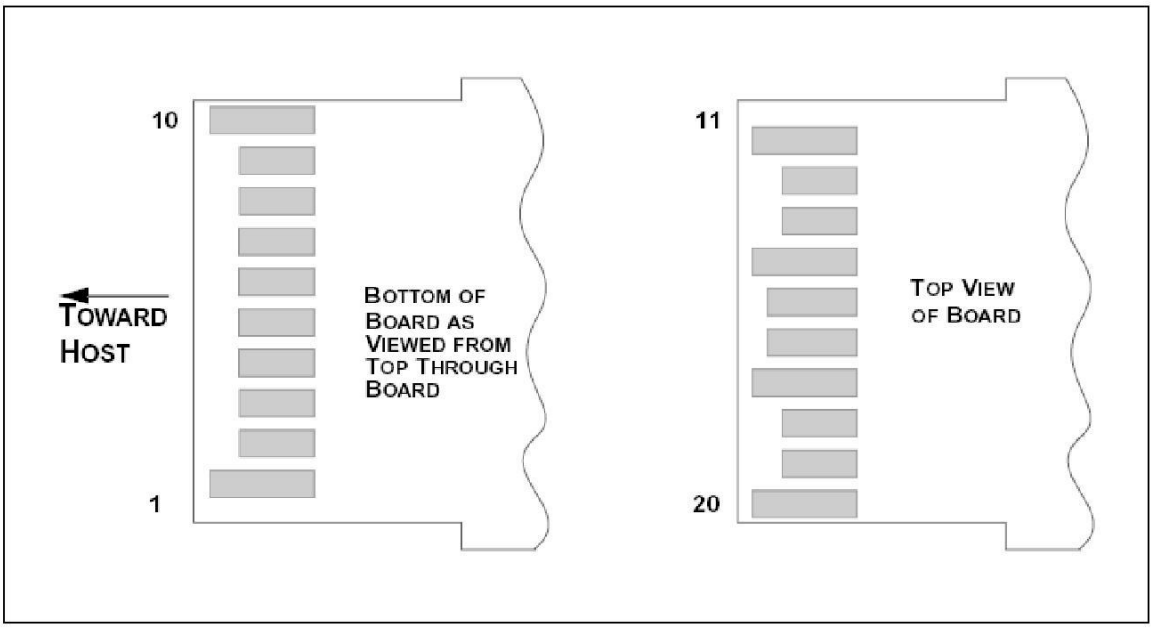
Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
50 / 125 um MMF OM3		2		70	m
50 / 125 um MMF OM4		2		100	m
Data Rate				28.05	Gbps
Transmitter					
Centre Wavelength	λC	840	850	860	nm
Spectral Width (RMS) @ 28.05Gb/s	Δλ			0.6	nm
Average Output Power: 50 MMF	Pout	-6.7		2.4	dBm
Optical Modulation Amplitude @ 28.05 Gb/s	OMA	-3.2			dBm
Vertical Eye Closure Penalty @ 28.05 Gb/s	VECP			3.13	dB
Receiver					
Centre Wavelength	λC	840	850	860	nm
Receiver Sensitivity(OMA)*Note4	Pmin			-10.2	dBm
Receiver Overload	Pmax	3			dBm

Optical Return Loss	ORL			-12	dB
LOS De-Assert	LOSD			-13	dBm
LOS Assert	LOSA	-30			dBm
LOS Hysteresis		0.5			dB

SFP28 Transceiver Electrical Pad Layout





Pin Function Definitions

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	Data line for Serial ID.
5	SCL	Module Definition 1	3	Clock line for Serial ID.
6	MOD-ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTL).	3	Rate Select 0, optionally controls SFP28 module receiver. This pin is pulled low to VeeT with a >30K resistor..
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTL).	1	Rate Select 1, optionally controls SFP28 module transmitter. This pin is pulled low to VeeT with a >30K resistor.
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3V ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3V ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K~10 K Ω resistor. Its states are:
Low (0 – 0.8V): Transmitter on
(>0.8, < 2.0V): Undefined
High (2.0 – 3.465V): Transmitter Disabled
Open: Transmitter Disabled

3) Module Absent, connected to VeeT or VeeR in the module.

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and Vcc_Host. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5) VeeR and VeeT may be internally connected within the SFP28 module.

6) RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 185 and 425 mV differential (92.5 –212.5 mV single ended) when properly terminated.

7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pin. Maximum supply current is 340mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP28 input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP28 transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP28 transceiver module.

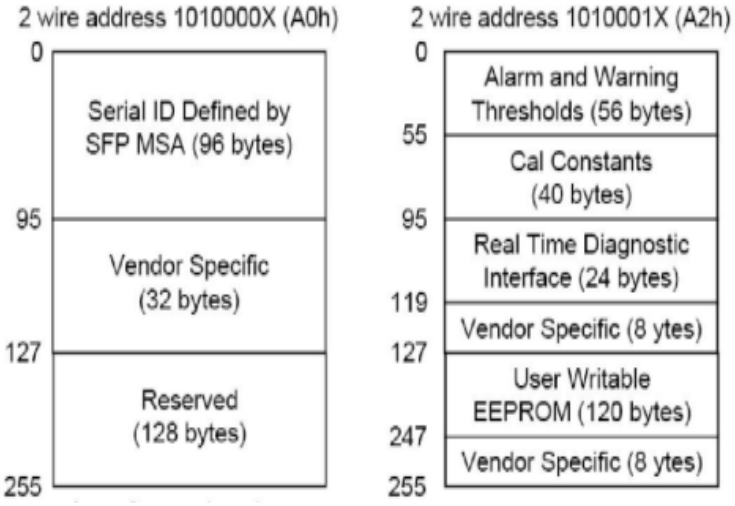
8) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 90 – 800 mV (45 – 400 mV single-ended), though it is recommended that values between 90 and 800 mV differential (45 – 400 mV single-ended) be used for best EMI performance.

EEPROM

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not writing protected within the SFP28 transceiver. The negative edge clocks data from the

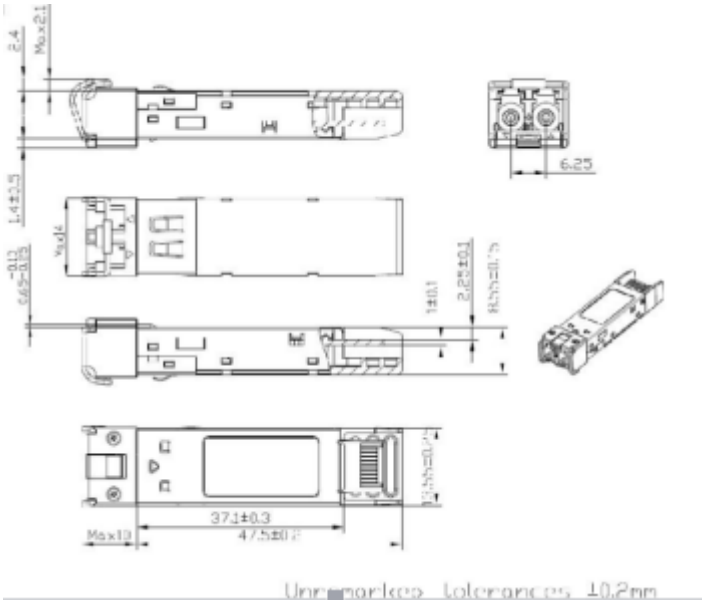
SFP28 transceiver. The serial data signal (SDA) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2H. The digital diagnostic memory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 10.3.



Mechanical Specifications

For detail mechanical information, please refer to the related document of SFF-8432.



Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Ordering information

Part No.	Data Rate	Laser	Fiber Type	Distance	Temp	CDR	DDMI
RYTQB01 *Note1	UP to 28.05Gbps	850nm VCSEL	OM3	2~70m	Standard	√	√
			OM4	2~100m			

Note1: Standard version

*: The product image only for reference purpose.