ESP3103-2D-GM

100M 1310nm Multi Mode SFP Optical Transceiver for SGMII port

PRODUCT FEATURES

- **100Mb/s transmission rate**
- **Compliant with IEEE 802.3, 100BASE-FX standard**
- **Compliant with SFP MSA**
- **For SGMII ports**
- **1310nm FP laser**
- **Standard bail mechanism**
- **Built-in digital diagnostic functions**
- **Hot-Pluggable SFP footprint**
- **Duplex LC Connectors**
- **Low power consumption**
- **Up to 2km on MMF**
- **Power supply 3.3V**
- **RoHS Compliant**
- **Operating temperature range: 0。C to 70。C**

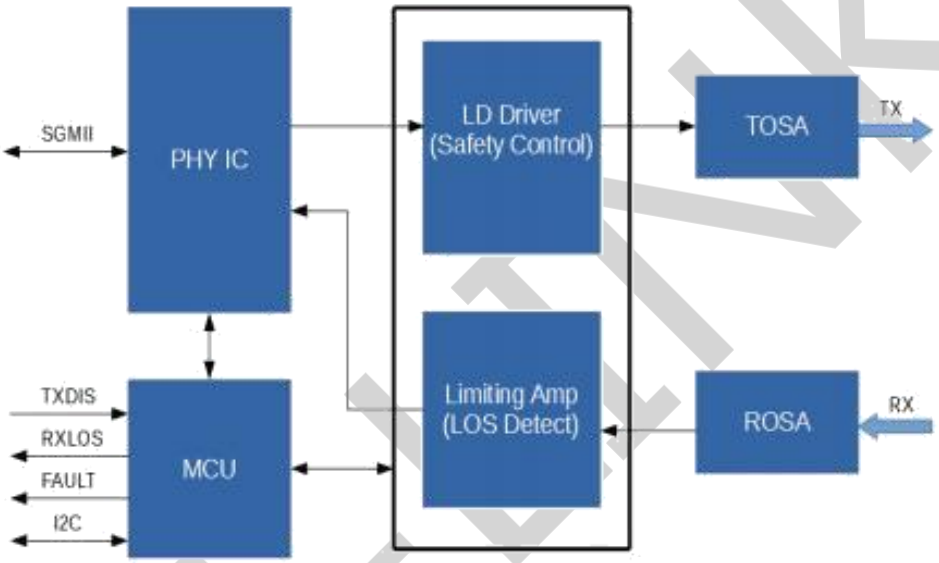
APPLICATIONS

- **100BASE-FX**

DESCRIPTIONS

ETU ESP3103-2D-GM 100Mb/s optical transceiver is used with Gigabit switches which support SGMII ports. The module has a PHY chip inside and can be used to support FE optical interfaces on gigabit switches. The product implements digital diagnostics via a 2-wire serial interface and is compliant with the SFP Multi-Source Agreement (MSA) standard.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
ESP3103-2D-GM	100M	FP	MMF	2km	LC	0°C ~ 70°C	Yes	Black

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Storage Ambient Temperature	TS	-40		85	。C	
Supply Voltage	VCC	-0.5		3.6	V	

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR		125		Mb/s	
Bit Error Rate	BER			10^{-12}		
Total Power Consumption	P			1	W	
Supply Current	ICC			300	mA	
Supply Voltage	VCC	3.15	3.3	3.45	V	1
Distance Range				2	KM	
Operating Temperature	TC	0		70	。C	2
Data Rate	DR			125	Mb/s	

Notes:

1. The voltage required for the module to work normally
2. Case temperature

Optical Characteristics Transmitter

VCC =3.15V to 3.45V,TC =0。C to 70。C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Transmitter						
Output Optical Power	PTX	-15		-8	dBm	1
Optical Center Wavelength	λC	1260	1310	1360	nm	
Extinction Ratio	ER	9	11	15	dB	
Spectral Width	Δλ			2.5	nm	
Relative Intensity Noise	RIN			-120	dB/Hz	
Transmitter Jitter	According to IEEE 802.3 requirement					
Receiver						
Center Wavelength Range	λ_C	1260	1310	1360	nm	
Receiver Sensitivity	R_{X_SEN}	-31			dBm	2
LOS Assert	LOS_A	-40			dBm	
LOS De-Assert	LOS_D			-31	dBm	
LOS Hysteresis	LOS_H	0.5		4.5	dB	

Notes:

1. Average
2. Measured with worst ER: BER<10^{-12};2^{31} -1 PRBS

Electrical – Characteristics – Transmitter

VCC =3.15V to 3.45V, TC =0。C to 70。C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R_{IN}		100		Ω	
Differential data input swing	V_{IN_PP}	250		1200	mV	
Transmit Disable Voltage	V_D	2		V_{CC}	V	
Transmit Enable Voltage	V_{EN}	GND		GND+0.8	V	
Transmit Disable Assert Time				10	us	

Electrical – Characteristics – Receiver

VCC =3.15V to 3.45V, TC =0。C to 70。C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential data output swing	$V_{OUT\ PP}$	300	500	800	mV	
Data output rise time (20%-80%)	t_r			3000	ps	
Data output fall time (20%-80%)	t_f			3000	ps	
LOS Fault	V_{LOS_A}	V_{CC}-0.5		V_{CC_HOST}	V	
LOS Normal	$V_{LOS\ D}$	GND		GND+0.5	V	

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_ Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI _VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_ bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Functions Description

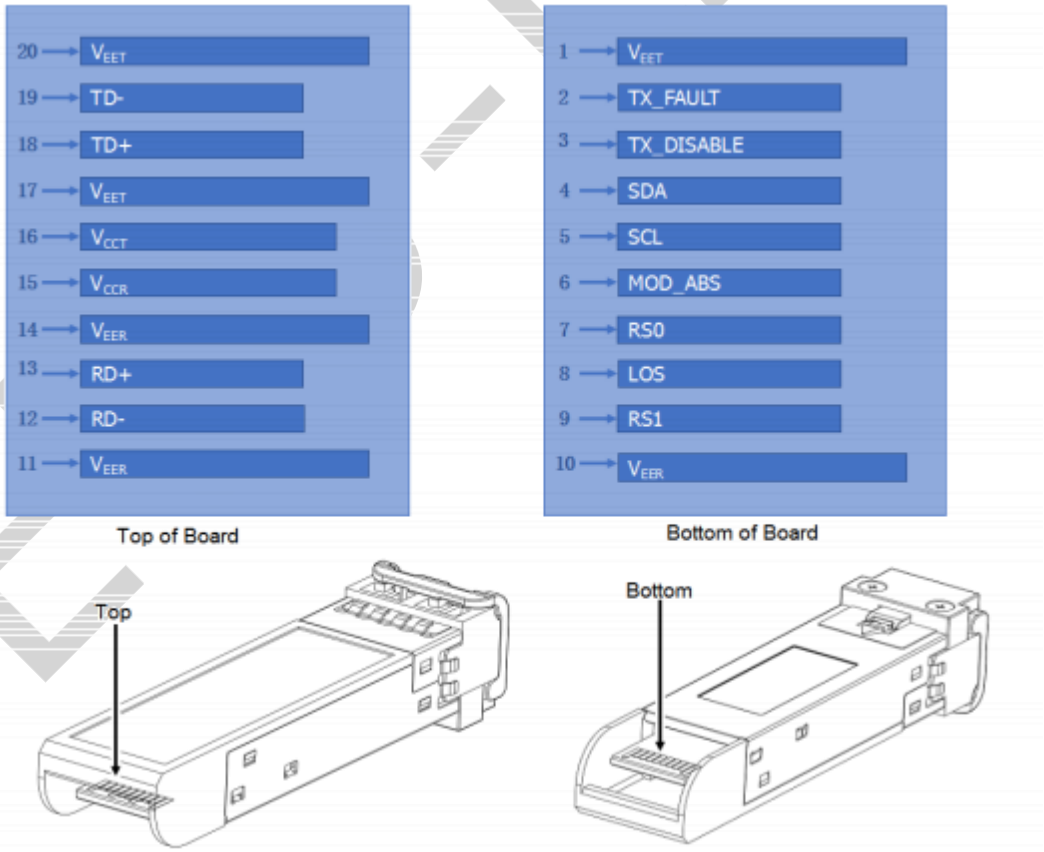
The ETU ESP3103-2D-GM is a 100M optical module that can be used in a Gigabit switch. The module integrates a PHY chip that supports the SGMII interface. The module is interconnected to the host's Gigabit interface via the SGMII interface. Through the SGMII protocol, an optical interface con- forming to the 100FX standard is provided. The product meets SFP specifications and supports digital diagnostics to help Gigabit switch ports interconnect with 100M legacy optical interface devices.

The transmitter of the module consists of a laser driver and a TOSA (light-emitting component). The TOSA uses a FP laser with a wavelength of 1310 nm. When the module is working, the PHY chip out- put signal is sent to the laser driver section. At this time, the laser driver supplies the bias current and the modulation current to the laser. The laser driver simultaneously uses an automatic optical power control (APC) feedback loop to maintain a constant average optical power of the laser output.

The receiver of the module consists of a limiting amplifier and a ROSA (light receiving component).

ROSA uses a PIN with a wavelength of 1310 nm. When ROSA detects the incident light signal, the PIN converts the optical signal into a photo-generated current. The photo-generated current is amplified by a TIA (transimpedance amplifier) and converted into an electrical signal. The electrical signal is further amplified by the limiting amplifier , then outputs a fixed-amplitude electrical signal to the host.

Pin Diagram



Pin Assignment

PIN #	Symbol	Description	Remarks
1	V_{EET}	Transmitter ground (common with receiver ground)	1
2	TX_FAULT	Transmitter Fault. Not supported	
3	TX_DISABLE	Transmitter Disable. Laser output disabled on high or open	2
4	MOD_DEF(2)	Module Definition 2. Data line for serial ID	3
5	MOD_DEF(1)	Module Definition 1. Clock line for serial ID	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	4
9	V_{EER}	Receiver ground (common with transmitter ground)	1
10	V_{EER}	Receiver ground (common with transmitter ground)	1
11	V_{EER}	Receiver ground (common with transmitter ground)	1
12	RD-	Receiver Inverted DATA out. AC coupled. SGMII interface	
13	RD+	Receiver Non-inverted DATA out. AC coupled. SGMII interface	
14	V_{EER}	Receiver ground (common with transmitter ground)	1
15	V_{CCR}	Receiver power supply	
16	V_{CCT}	Transmitter power supply	
17	V_{EET}	Transmitter ground (common with receiver ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC coupled. SGMII interface	
19	TD-	Transmitter Inverted DATA in. AC coupled. SGMII interface	
20	V_{EET}	Transmitter ground (common with receiver ground)	1

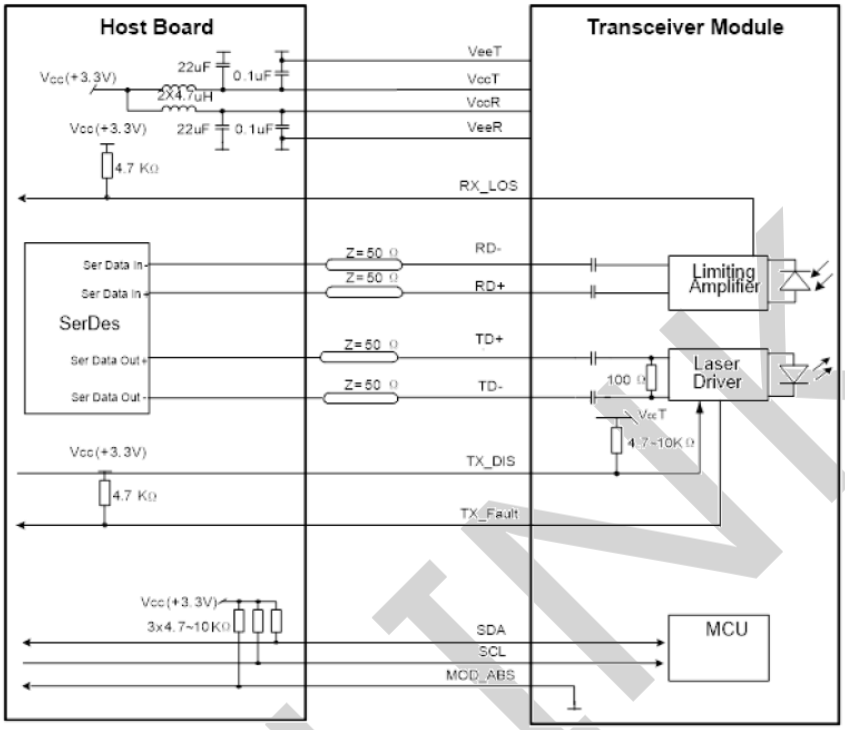
Notes:

1. Circuit ground is isolated from chassis ground
2. Disabled: T_{DIS}>2V or open, Enabled: T_{DIS}<0.8V
3. Should Be pulled up with 4.7k -10k ohm on host board to a voltage between 2V and 3.6V
4. LOS is open collector output

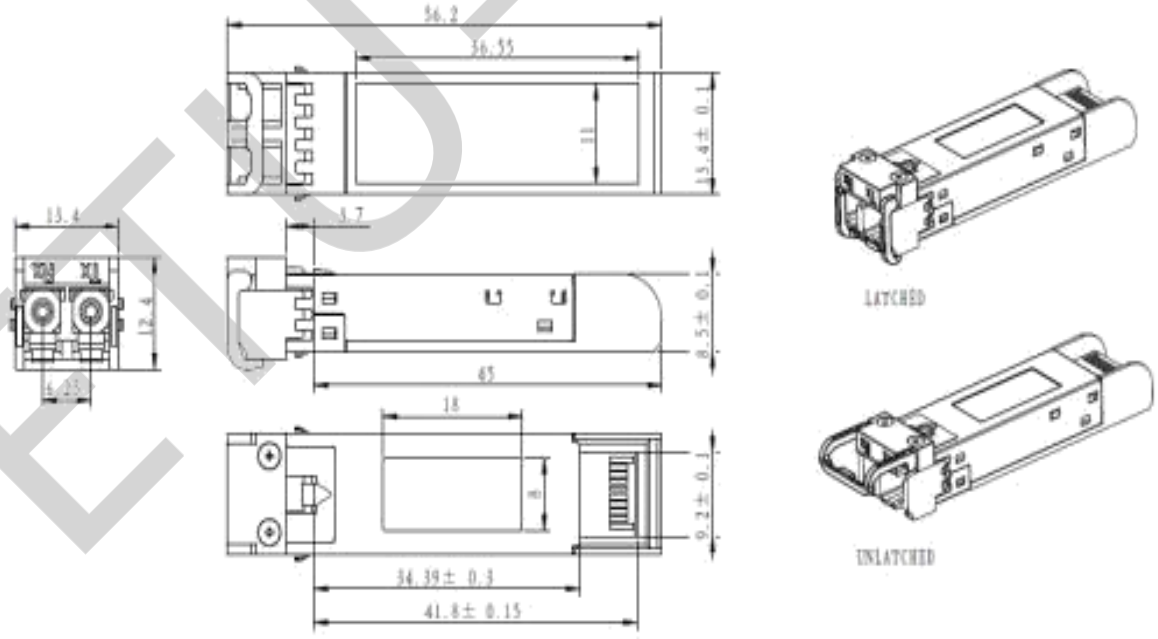
References

1. IEEE standard 802.3. IEEE Standard Department.
2. Serial-GMII Specification.

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 12, 2018	Preliminary datasheet
2.0	July 26, 2024	Format change

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