

ESP31X6-20D(I)

14.025Gbps SFP+ Transceiver, Single Mode, 20km Reach

PRODUCT FEATURES

- Supports up to 14.025Gbps bit rates
- Hot-pluggable SFP+ footprint
- 1310nm DFB laser and PIN photodiode, Up to 20km for SMF transmission
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- Temperature Range:
 - Commercial: 0°C ~70°C
 - Industrial: -40°C ~85°C



APPLICATIONS

- 4.25/8.5/14.025G Fibre channel

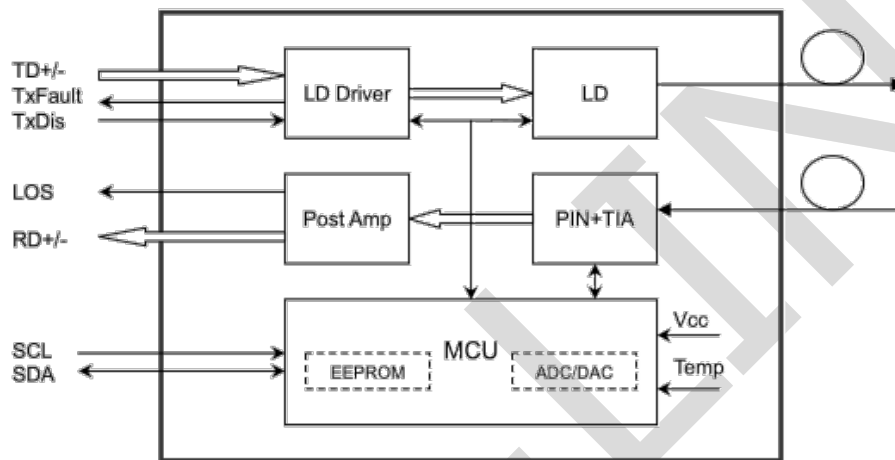
DESCRIPTIONS

The SFP+ transceivers are high performance, cost effective modules supporting data rate of 14.025Gbps and 20km transmission distance with SMF.

The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
ESP31X6-20D	14.025Gbps	DFB	SMF	20km	LC	0~70°C	Yes	Blue
ESP31X6-20DI	14.025Gbps	DFB	SMF	20km	LC	-40~85°C	Yes	Blue

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	T _c	0/-40		+70/+85	°C
Power Supply Voltage	V _{cc}	3.135	3.30	3.465	V
Power Supply Current	I _{cc}			350	mA
Data Rate			14.025		Gbps

Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λ _c	1295	1310	1325	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Side-Mode Suppression Ratio	SMSR	30	-		dB	
Average Output Power	P _{out}	-5		2	dBm	1
Extinction Ratio	ER	3.5			dB	
Data Input Swing Differential	V _{IN}	180		850	mV	2
Input Differential Impedance	Z _{IN}	90	100	110	Ω	
TX Disable	Disable	2.0		V _{cc}	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		V _{cc}	V	
	Normal	0		0.8	V	
Receiver						
Centre Wavelength	λ _c	1260		1600	nm	
Receiver Sensitivity				-12	dBm	3
Receiver Overload		2			dBm	3
LOS De-Assert	LOS _D			-13	dBm	
LOS Assert	LOS _A	-30			dBm	
LOS Hysteresis		0.5			dB	
Data Output Swing Differential	V _{out}	300		900	mV	4
LOS	High	2.0		V _{cc}	V	
	Low			0.8	V	

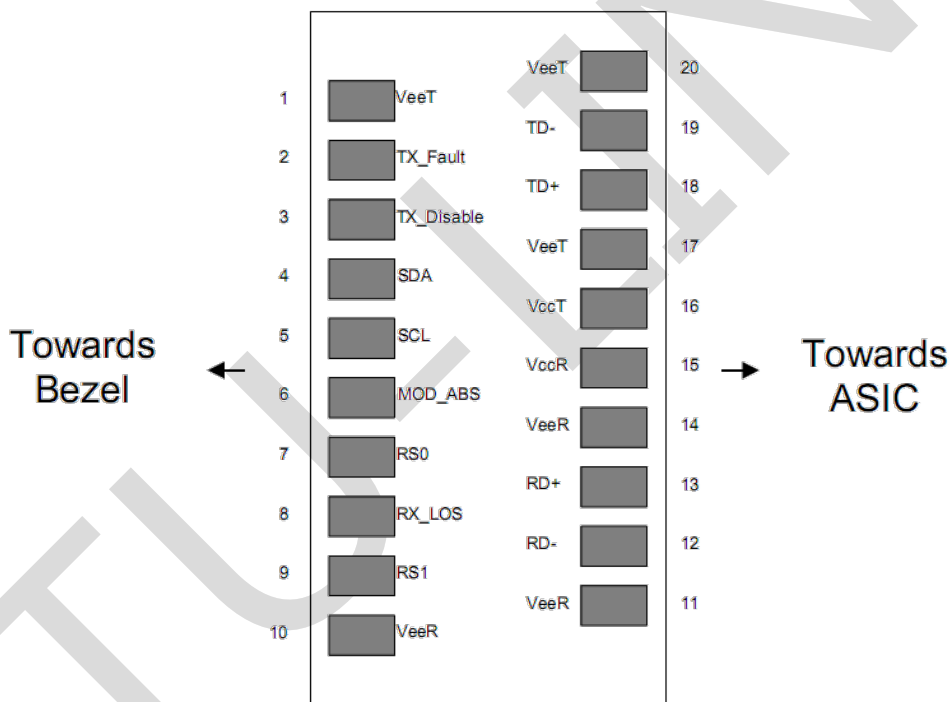
Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2³¹-1 test pattern @14025Mbps, BER ≤1×10⁻¹².
4. Internally AC-coupled.

Digital Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	-6.5 to -0.5	dBm	±3dB	Internal
RX Power	-20 to -1	dBm	±3dB	Internal

Pin Diagram



Pin Definitions

Pin	Signal Name	Description	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
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	

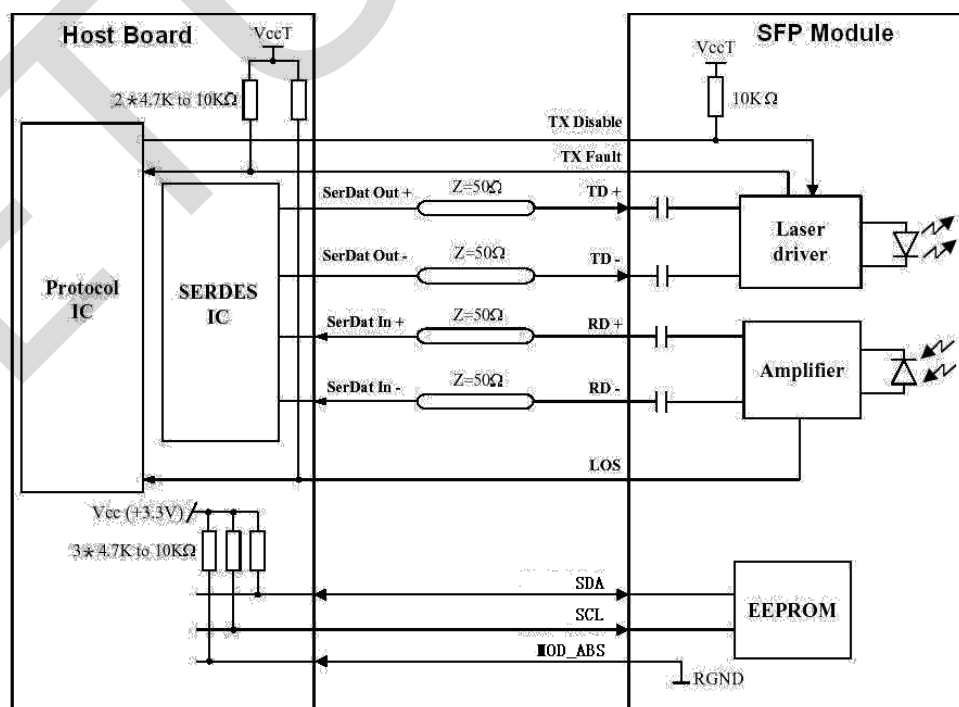
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	VEER	Receiver ground	1	
11	VEER	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	VEER	Receiver ground	1	
15	VCCR	Receiver Power Supply	2	
16	VcCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	VEET	Transmitter Ground	1	

Notes:

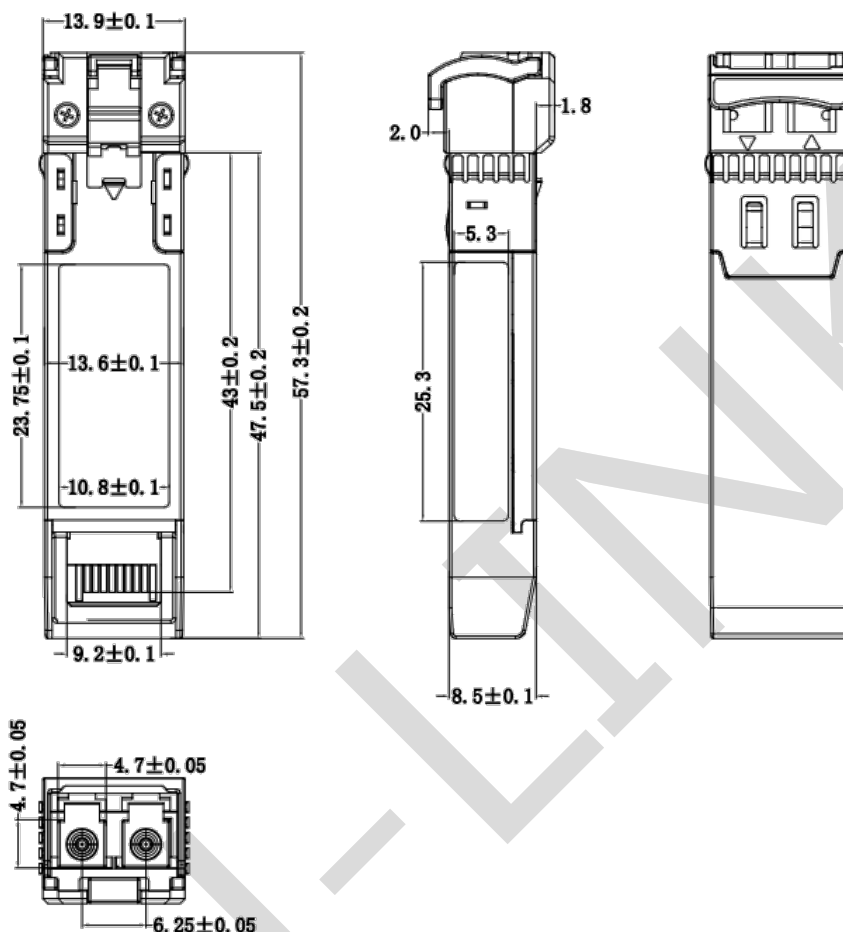
Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- 2) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- 3) LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
- 4) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 5) TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 8, 2019	Preliminary datasheet
2.0	July 26, 2024	Format change

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