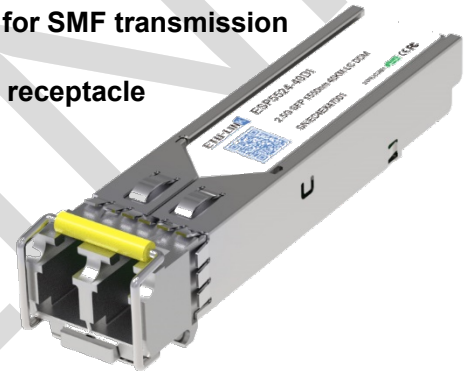


ESP5524-40D(I)

2.5Gbps SFP Transceiver, Single Mode, 40km Reach

PRODUCT FEATURES

- Supports up to 2.5Gbps bit rates
- Hot-pluggable SFP footprint
- 1550nm DFB laser and PIN photo detector, Up to 40km 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
- Operating case temperature:
 - Standard: 0 to +70°C
 - Industrial: -40 to +85°C



APPLICATIONS

- 2.5Gbps Optical systems
- Fiber Channel
- Other Optical links

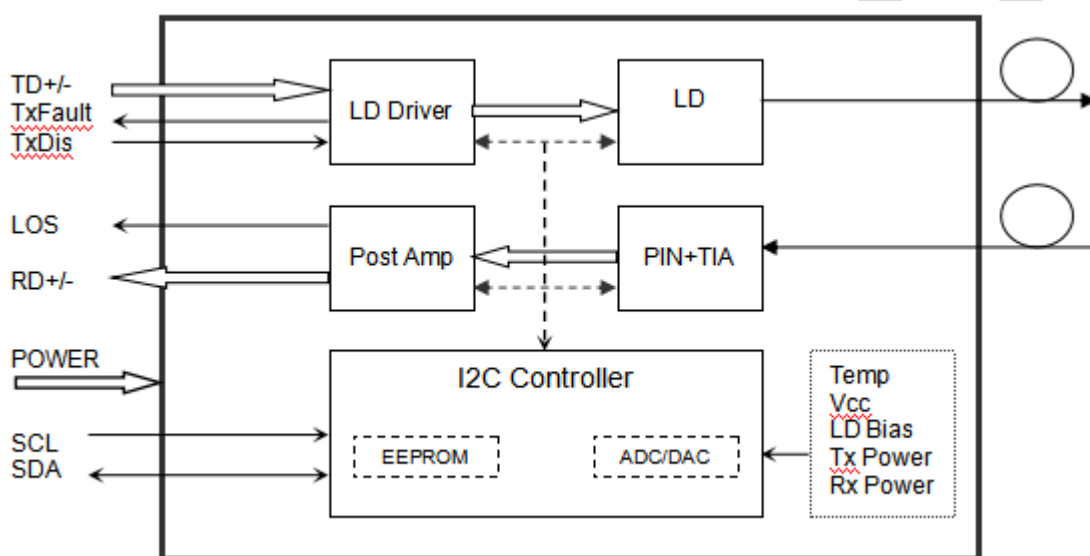
DESCRIPTIONS

The SFP transceivers are high performance, cost effective modules supporting data rate of 2.5Gbps and 40km 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
ESP5524-40D	2.5Gbps	DFB	SMF	40KM	LC	0~70°C	Yes	yellow
ESP5524-40DI	2.5Gbps	DFB	SMF	40KM	LC	-40~85°C	Yes	yellow

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{cc}	-0.5	4.5	V
Storage Temperature	T _s	-40	+85	°C
Operating Humidity	-	5	85	%

Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Centre Wavelength		λ_c	1530	1550	1570	nm	
Spectral Width (-20dB)		$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio		SMSR	30	-	-	dB	
Average Output Power		P _{out}	-5		+3	dBm	1
Extinction Ratio		ER	8.2			dB	
Data Input Swing Differential		V _{IN}	180		1200	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	1270		1610	nm	
Receiver Sensitivity					-19	dBm	3
Receiver Overload			-1			dBm	3
LOS De-Assert		LOS _D			-20	dBm	
LOS Assert		LOS _A	-35			dBm	
LOS Hysteresis			0.5			dB	
Data Output Swing Differential		V _{out}	600	800	1000	mV	4
LOS	High		2.0		V _{cc}	V	
	Low				0.8	V	

Notes:

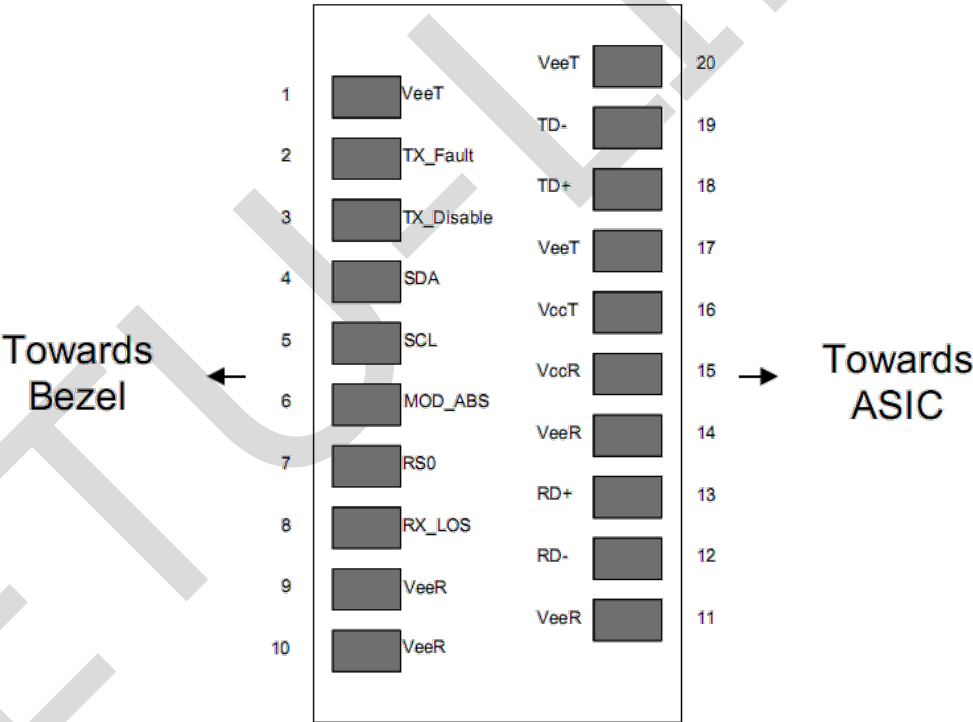
1. The optical power is launched into SMF.

2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2²³-1 test pattern @2500Mbps, BER ≤1×10⁻¹².
4. Internally AC-coupled.

Digital Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	-40 to +85	°C	±3	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	-5 to +3	dBm	±3dB	Internal
RX Power	-19 to -1	dBm	±3dB	Internal

Pin Diagram



Pin Definitions

Pin	Name	Function	Notes
1	V _{EET}	Transmitter Ground	1
2	TX FAULT	Transmitter Fault Indication	3

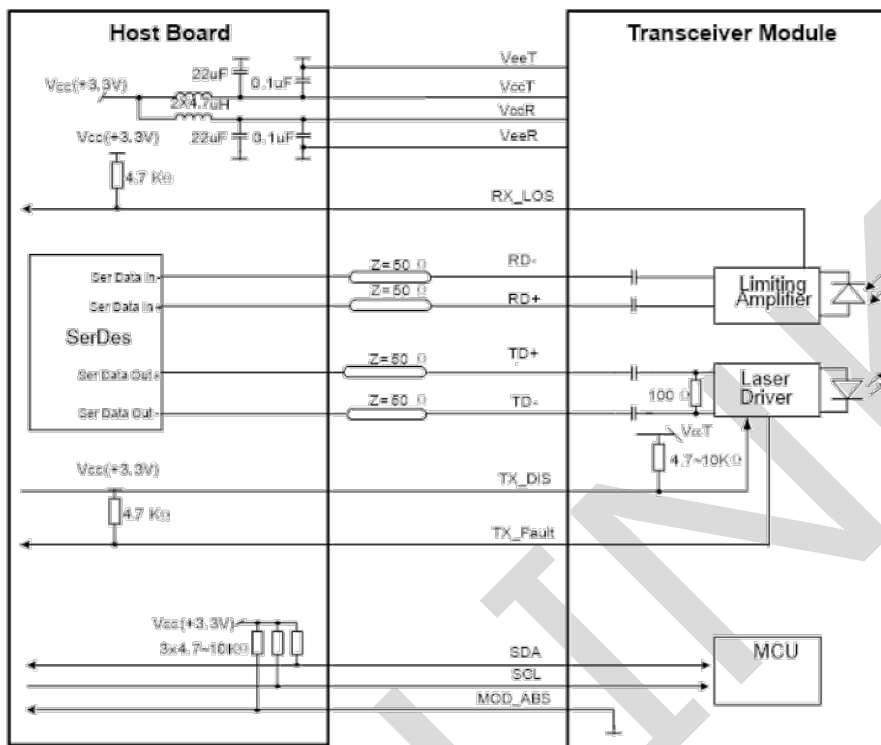
Pin	Name	Function	Notes
3	TX DISABLE	Transmitter Disable	3
4	SDA	SDA Serial Data Signal	3
5	SCL	SCL Serial Clock Signal	3
6	MOD_ABS	Module Absent. Grounded within the module	3
7	RS0	Not Connected	3
8	LOS	Loss of Signal	3
9	V _{EER}	Receiver ground	1
10	V _{EER}	Receiver ground	1
11	V _{EER}	Receiver ground	1
12	RD-	Inv. Received Data Out	3
13	RD+	Received Data Out	3
14	V _{EER}	Receiver ground	1
15	V _{CCR}	Receiver Power Supply	2
16	V _{CCT}	Transmitter Power Supply	2
17	V _{EET}	Transmitter Ground	1
18	TD+	Transmit Data In	3
19	TD-	Inv. Transmit Data In	3
20	V _{EET}	Transmitter Ground	1

Notes:

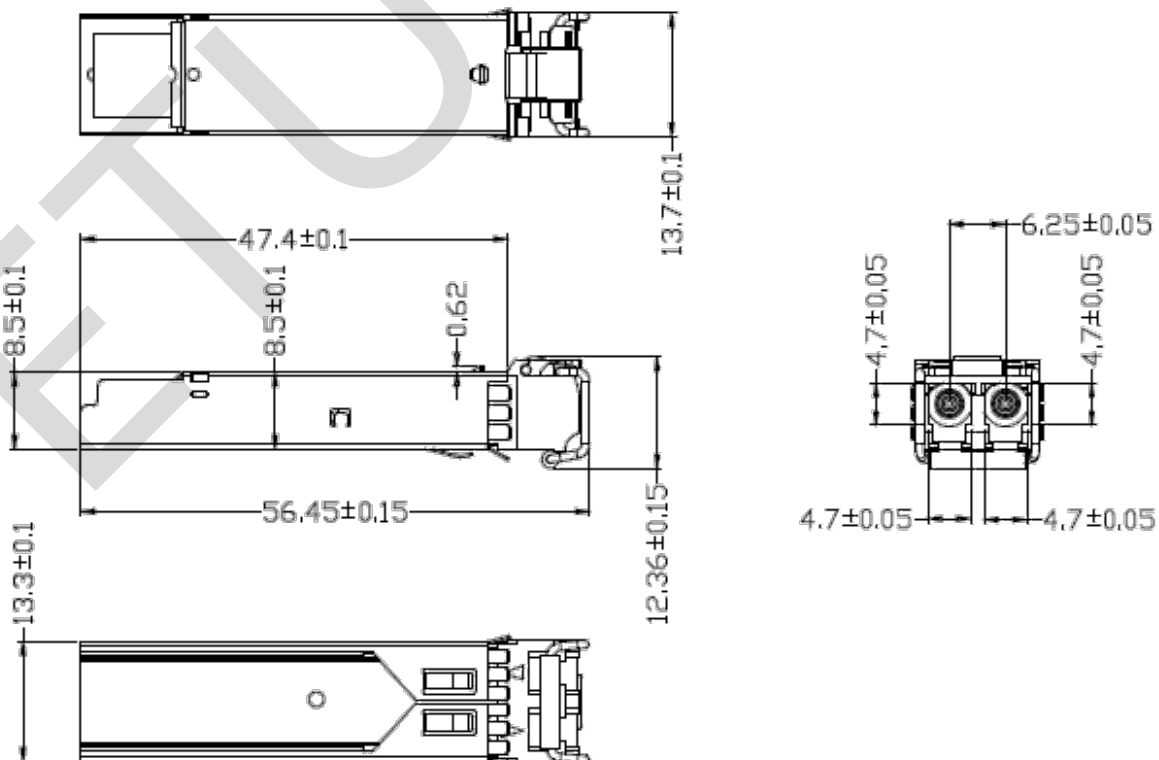
Plug Seq.: Pin engagement sequence during hot plugging.

- 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 V_{cc}+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, 2016	Preliminary datasheet
2.0	October 11, 2023	Product upgrades
3.0	July 29, 2024	Format change

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