

25Gbps 1310nm 40km SFP28 Optical Transceiver Module

S-PP2531L40-CD

Features

- Supports up to 25.78Gbps bit rates
- Hot-pluggable SFP+ footprint
- Up to 40km for SMF transmission
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- Operating case temperature: 0 to +70°C
- Compatible with RoHS

Applications

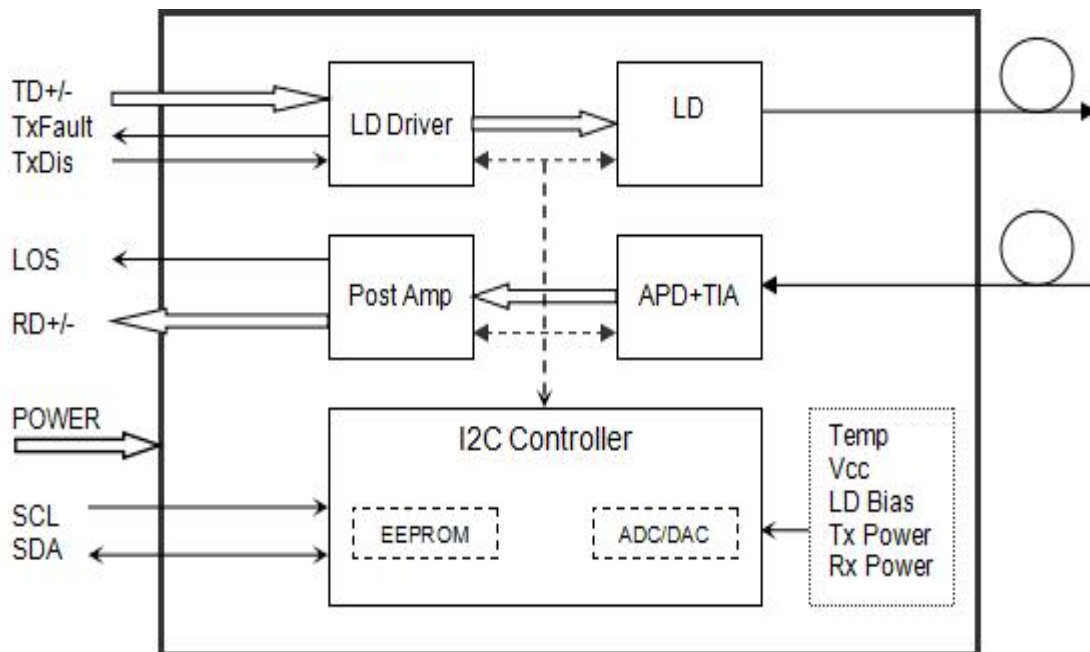
- 25GBASE-ER

Description

SFP28 transceivers are high performance, cost effective modules supporting data rate of 25.78Gbps and 40km transmission distance with SMF.

The transceiver consists of three sections: a EML laser transmitter, a APD 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.



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Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	V _{cc}	-0.3		4	V
Storage Temperature Range	T _s	-40		+85	°C
Relative Humidity - Operating	RH _o	5		95	%
Signal Input Voltage	V _{SI}	V _{cc} -0.3	-	V _{cc} +0.3	V

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Case Operating Temperature Range	T _c	0		+70	°C
Power Supply Voltage	V _{cc}	3.14	3.3	3.47	V
Supply Current	I _{cc}			600	mA
Data Rate	BR	-	25.78	-	Gbps

Optical and Electrical Characteristics

Transmitter Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Centre Wavelength	λ _c	1295		1310	nm	
Average Launched Power	P _O	0		+6.0	dBm	
Average Launched Power(Laser Off)	P _{off}	-	-	-30	dBm	
Spectrum Bandwidth(-20dB)	Δλ	-	-	1	nm	
Side-Mode Suppression Ratio	SMSR	30	-	-	dB	
Transmitter and Dispersion Penalty	TDP			1	dB	
Extinction Ratio	ER	6		-	dB	
Receiver Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ _{IN}	1272.55	-	1310.19	nm	
Receiver Sensitivity-AVG	PSens			-19	dBm	Note (1)
Receiver Sensitivity-OMA	PSens-OMA			-18.2	dBm	Note(1)
Input Saturation Power (Overload)	PSAT	-4	-	-	dBm	Note (1)
Receiver Reflectance				-26	dB	
Los Of Signal Assert	PA	-30	-	-	dBm	
Los Of Signal De-assert	PD	-	-	-20	dBm	
LOS -Hysteresis	PHys	0.5			dB	
Note:						
1. BER≤5x10 ⁻⁵						

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Electrical Interface Characteristics

High Speed Electrical Interface Characteristics

Transmitter						
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Differential input swing	V _{in(pp)}	190		700	mV	
Differential input return loss (min)	RL _{d(f)}	9.5–0.37f, 0.01≤f<8			dB	
		4.75–7.4log10(f/14), 8 ≤f<19				
Differential to common mode input return loss (min)	RL _{dc(f)}	22-20(f/25.78), 0.01≤f<12.89			dB	
		15-6(f/25.78), 12.89≤f<19				
Differential termination mismatch	T _m	-	-	10	%	
Eye width	E _w	-	-	0.46	UI	
Applied pk-pk sinusoidal jitter	P _{pj}	Per IEEE 802.3bm				
Eye height	E _h	-	95	-	mV	
DC common mode voltage	DC _v	-350	-	2850	mV	
Receiver						
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Differential data output swing	V _{out (pp)}	300	-	850	mV	
Eye width	E _w	0.57	-	-	UI	
Vertical eye closure	V _{ec}	-	-	5.5	dB	
Differential output return loss (min)	RL _{d(f)}	9.5–0.37f, 0.01≤f<8			dB	
		4.75–7.4log10(f/14), 8 ≤f<19				
Common to differential mode conversion return loss (min)	RL _{dc(f)}	22-20(f/25.78), 0.01≤f<12.89			dB	
		15-6(f/25.78), 12.89≤f<19				
Differential termination mismatch	T _m	-	-	10	%	
Transition time, 20% to 80%	T _r /T _f	12	-	-	ps	20%~80%

LOW Speed Electrical Interface Characteristics

Transmitter						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter Fault Output-High	V_{FaultH}	2	-	$V_{cc}+0.3$	V	
Transmitter Fault Output-Low	V_{FaultL}	0	-	0.8	V	
Transmitter Disable Voltage- High	V_{DisH}	2	-	$V_{cc}+0.3$	V	
Transmitter Disable Voltage- low	V_{DisL}	0	-	0.8	V	
Receiver						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
LOS Output Voltage-High	V_{LOSH}	2	-	$V_{cc}+0.3$	V	
LOS Output Voltage-Low	V_{LOSL}	0	-	0.8	V	

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Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time	t_loss_off			100	μs
Serial ID Clock Rate	f_serial_clock		100	400	KHz
MOD_DEF (0:2)-High	V _H	2		V _{cc}	V
MOD_DEF (0:2)-Low	V _L			0.8	V

Diagnostics

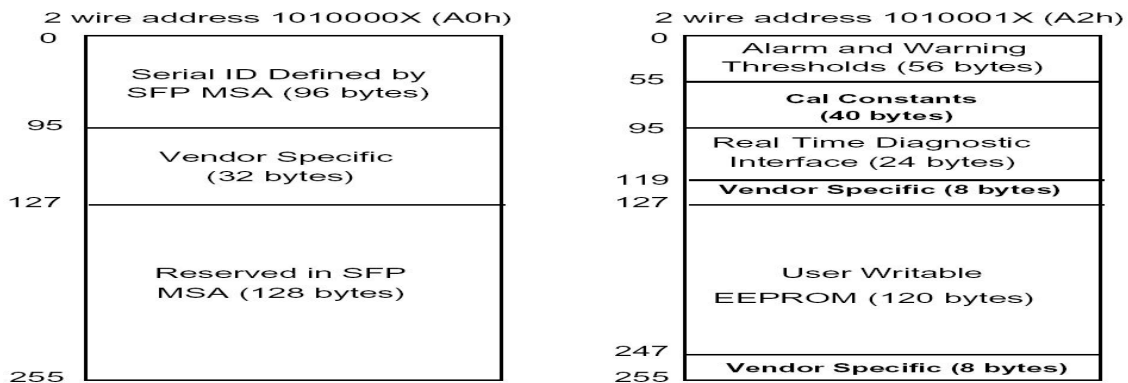
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to 70	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	0 to 6	dBm	±3dB	Internal
RX Power	-19 to -4	dBm	±3dB	Internal

Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

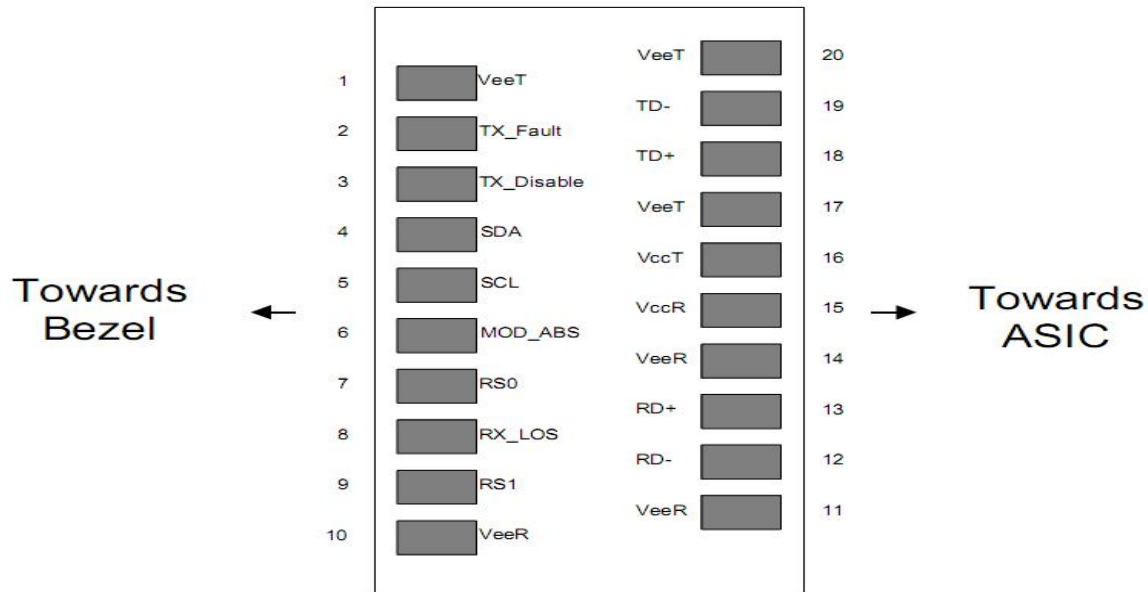
The digital diagnostic memory map specific data field defines as following.



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Pin Definitions



Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	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	V _{EER}	Receiver ground	1	
11	V _{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	V _{EER}	Receiver ground	1	
15	V _{CCR}	Receiver Power Supply	2	
16	V _{CCT}	Transmitter Power Supply	2	

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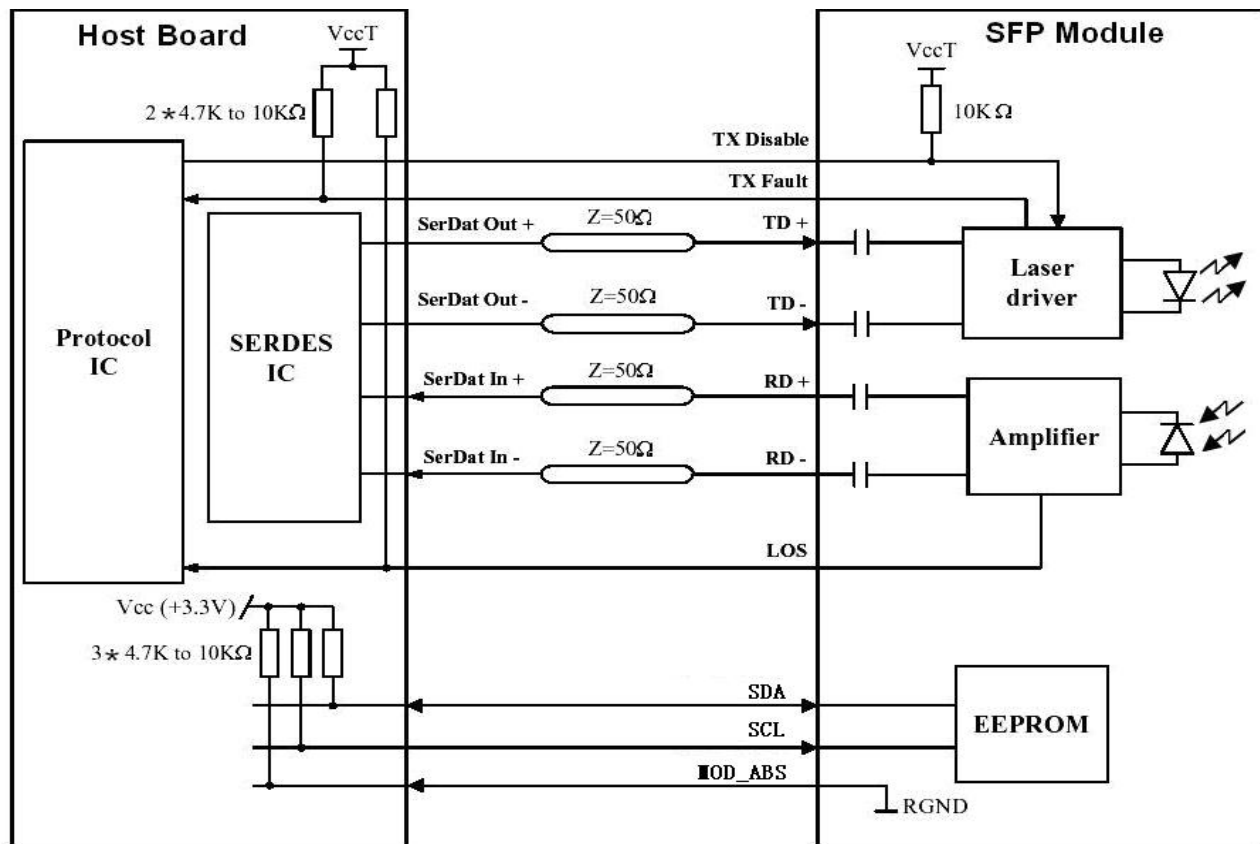
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17	V _{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	V _{EET}	Transmitter Ground	1	

Notes:

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.

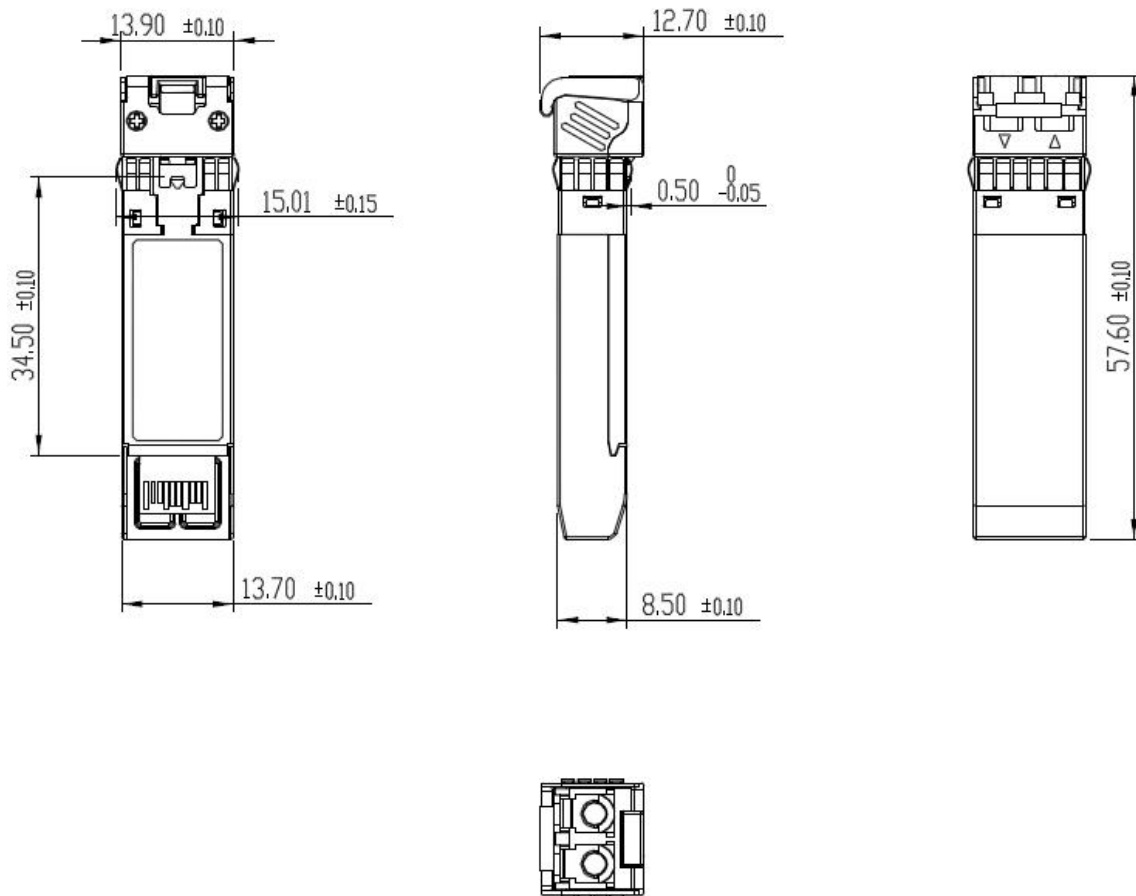
Recommended High-speed Interface Circuit



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Mechanical Dimensions



Ordering information

Part Number	Product Description
S-PP2531L40-CD	SFP28, 25.78Gbps, 1310nm, LC,SMF, 40km , 0°C~+70°C, With DDM