SFP28-25G-ER30

25Gbps SFP28 Transceiver, Single Mode, 30km Reach

Product Features

- Supports up to 25.78Gbps bit rates
- Hot-pluggable SFP+ footprint
- Up to 30km 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

- 25GBASE-ER Lite

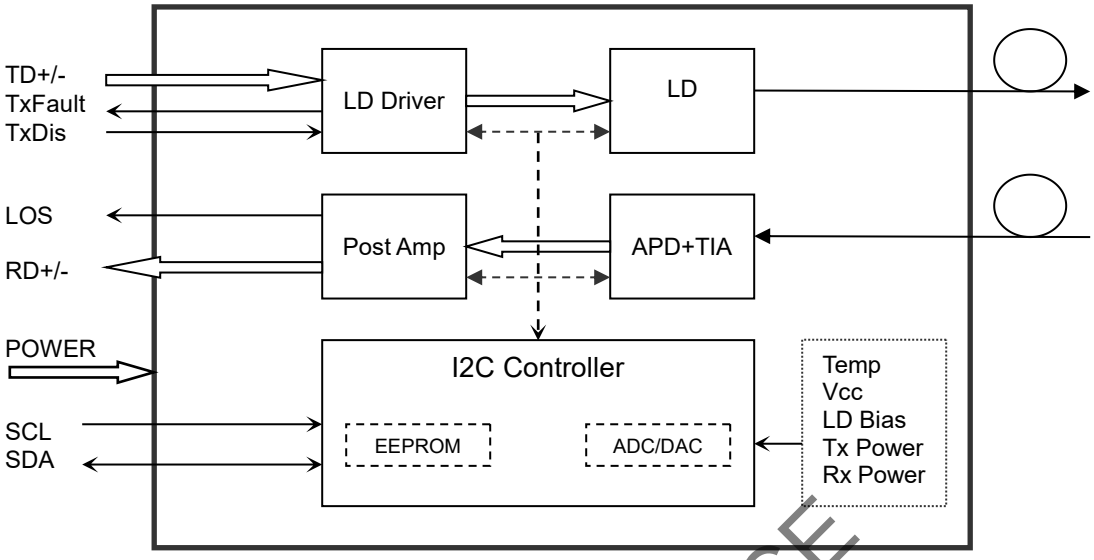
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Description

The SFP28 transceivers are high performance, cost effective modules supporting data rate of 25.78Gbps and 30km transmission distance with SMF.

The transceiver consists of three sections: a DML 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.



Transceiver functional diagram

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T_s	-40	-	85	ºC	
Relative Humidity	R_H	5	-	95	%	
Power Supply Voltage	V_{CC}	-0.3	-	4	V	
Signal Input Voltage	V_{SI}	Vcc-0.3	-	Vcc+0.3	V	

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Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature(Standard)	Tc	0		+70	°C
Operating Case Temperature(Industrial)	Tc	-40		+85	°C
Power Supply Voltage	Vcc	3.135	3.30	3.465	V
Power Supply Current	Icc			600	mA
Data Rate			25.78		Gbps
Transmission Distance	TD		30		km

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Centre Wavelength	λc	1295		1315	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	
Output Eye Mask	Compliant with IEEE 802.3cc					Note (2)
Receiver						
Input Optical Wavelength	λ_{IN}	1290	-	1325	nm	
Receiver Sensitivity-AVG	P_{Sens}			-19	dBm	Note (1)
Receiver Sensitivity-OMA	$P_{Sens-OMA}$			-18.2	dBm	Note(1)
Input Saturation Power (Overload)	P_{SAT}	-4	-	-	dBm	Note (1)
Receiver Reflectance				-26	dB	
Los Of Signal Assert	P_A	-30	-	-	dBm	
Los Of Signal De-assert	P_D	-	-	-20	dBm	
LOS -Hysteresis	P_{Hys}	0.5			dB	

Note:

Note (1): BER≤$5x10^{-5}$

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Electrical Interface Characteristics

High Speed Electrical Interface Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter						
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 4.75 – 7.4log10(f/14), 8 ≤f<19			dB	
Differential to common mode input return loss (min)	$RL_{dc(f)}$	22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19			dB	
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						
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 4.75 – 7.4log10(f/14), 8 ≤f<19			dB	
Common to differential mode conversion return loss (min)	$RL_{dc(f)}$	22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19			dB	
Differential termination mismatch	T_m	-	-	10	%	
Transition time, 20% to 80%	T_r/T_f	12	-	-	ps	20%~80%

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LOW Speed Electrical Interface Characteristics

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

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		Vcc	V
MOD_DEF (0:2)-Low	V_L			0.8	V

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Diagnostics

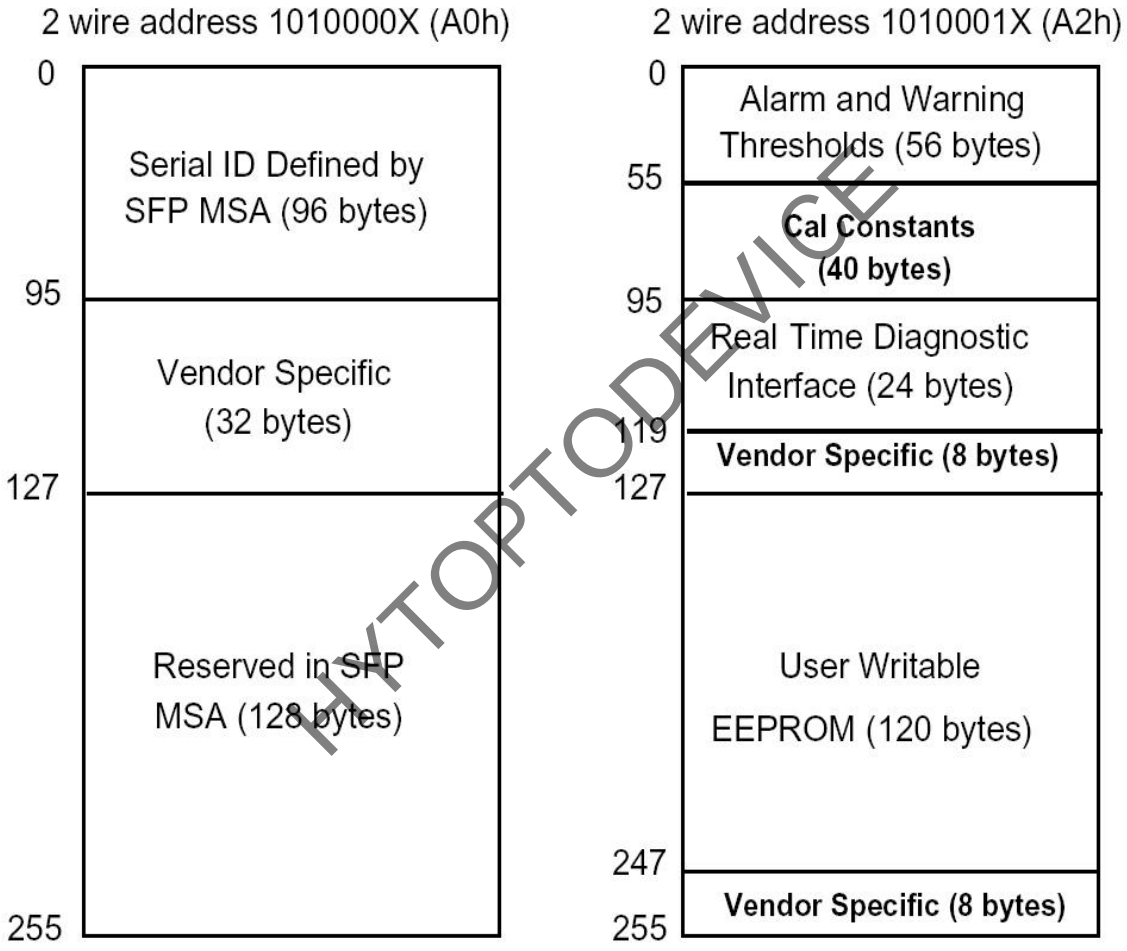
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to 70	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	0 to 6	dBm	±3dB	Internal
RX Power	-19 to -4	dBm	±3dB	Internal

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).

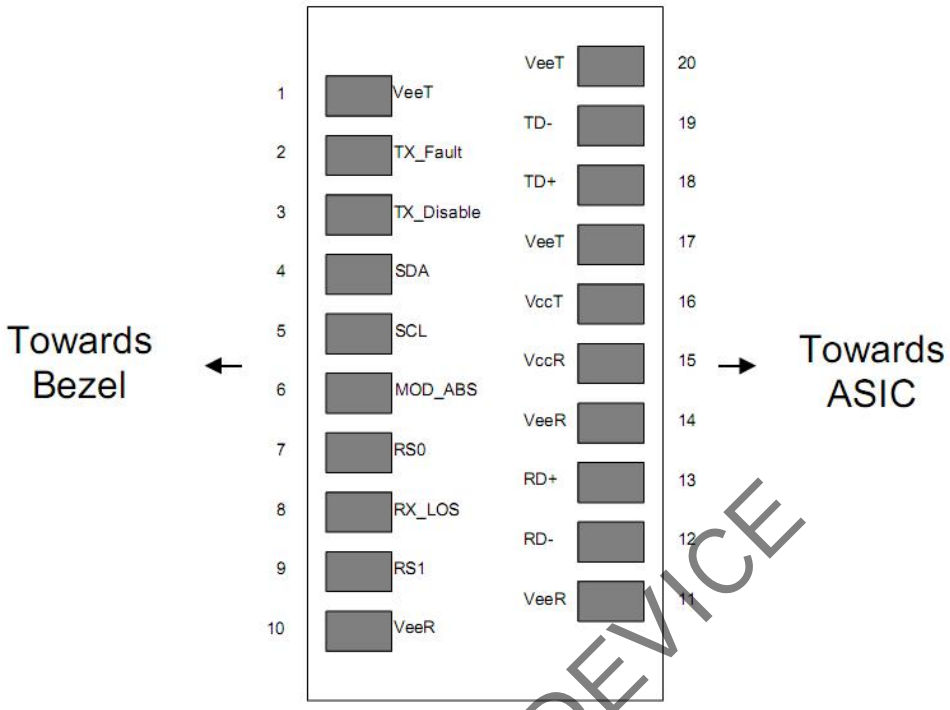
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

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



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Pin Descriptions



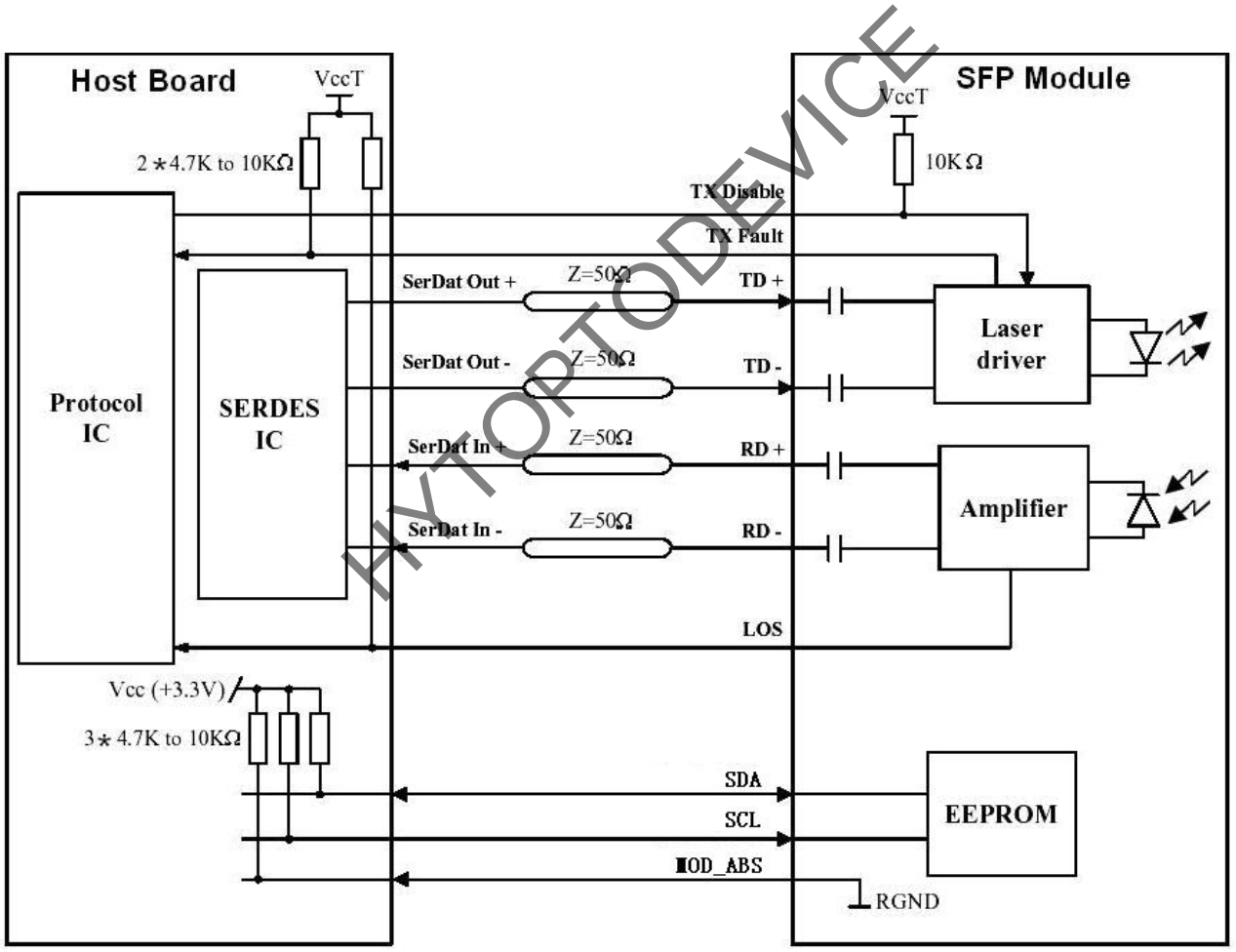
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Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module 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	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5

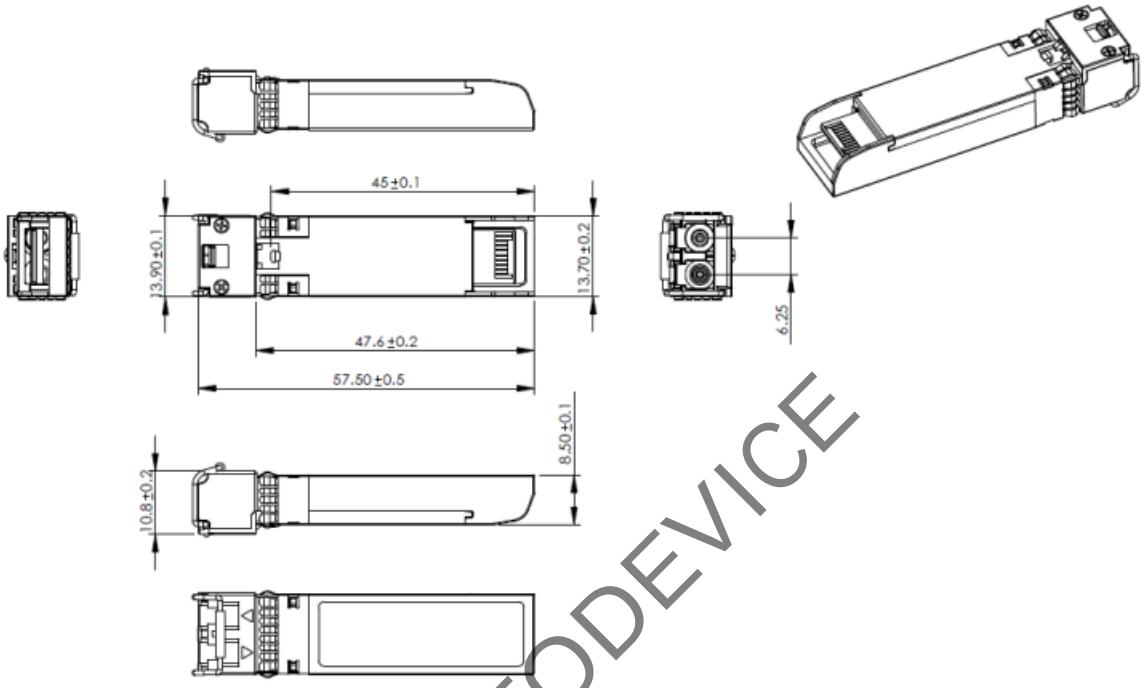
19	TD-	Inv. Transmit Data In	3	Note 5
20	V_{EET}	Transmitter Ground	1	

Notes:
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 Dimensions



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Ordering information

Part Number	Product Description
SFP28-25G-ER30	1310nm, 25.78Gbps, LC, 30km, 0°C~+70°C/-40°C~+85°C

For More Information

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