



10.3Gbps SFP+ Transceiver, Single Mode, 40km Reach E1010-203 SFP+ ER 1550 40KM

Product Features

- ▶ Supports up to 10.7Gbps bit rates
- ▶ Hot-pluggable SFP+ footprint
- ▶ Un-cooled 1550nm Cooled EML laser and PIN photodiode, 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: 0 to +70°C



Applications

- ▶ 10Gbps Optical systems
- ▶ 10GBASE-ER at 10.3125Gbps
- ▶ 10GBASE-EW at 9.953Gbps
- ▶ LTE systems
- ▶ Other Optical links

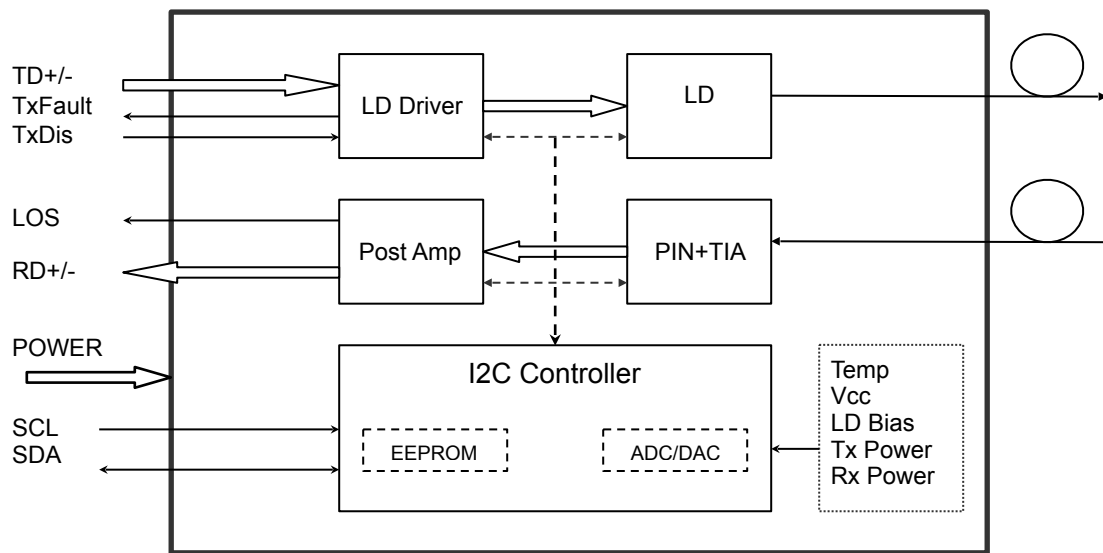
Description

The SFP+ ER transceivers are high performance, cost effective modules, supporting data rate of 10Gbps and 40km transmission distance with SMF.

The transceiver consists of three sections: a Cooled EML 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.



Transceiver functional diagram

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	Typical	Max	Unit
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Operating Case Temperature	T _c	0		+70	°C
Power Supply Voltage	V _{cc}	3.135	3.30	3.465	V
Power Supply Current	I _{cc}			550	mA
Data Rate		1.0	10.3	10.7	Gbps
Transmission Distance				40	km

Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λ_c	1530	1550	1565	nm	
Side-Mode Suppression Ratio	SMSR	30	-		dB	
Average Output Power	P _{out}	-1		+2	dBm	1
Extinction Ratio	ER	6.0			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				-15.5	dBm	3
Receiver Overload		0.5			dBm	3
LOS De-Assert	LOS _D			-17	dBm	
LOS Assert	LOS _A	-28			dBm	

LOS Hysteresis		0.5		4	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 @10312Mbps, BER ≤1×10⁻¹².
4. Internally AC-coupled.

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
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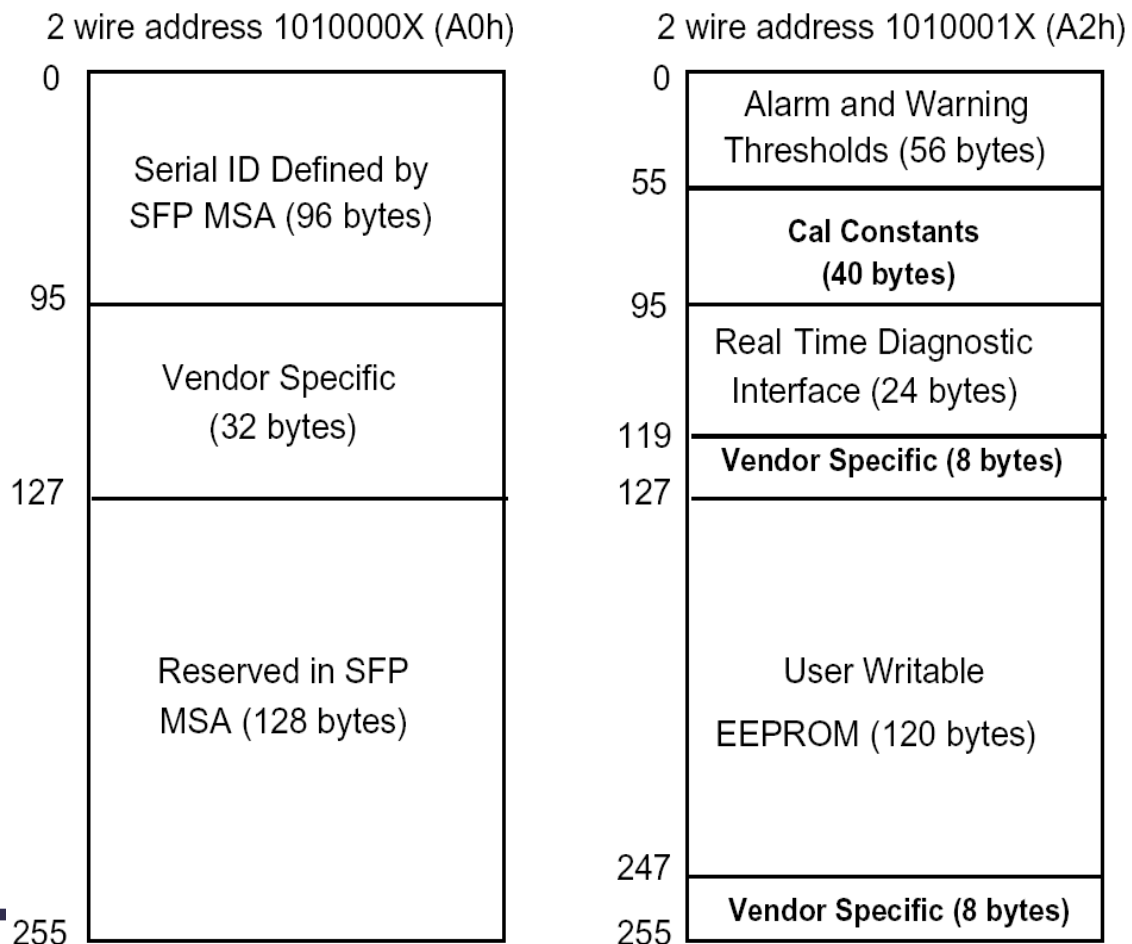
Temperature	0 to +70	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	-1 to +2	dBm	±3dB	Internal
RX Power	-16 to -1	dBm	±3dB	Internal

Digital Diagnostic Memory Map

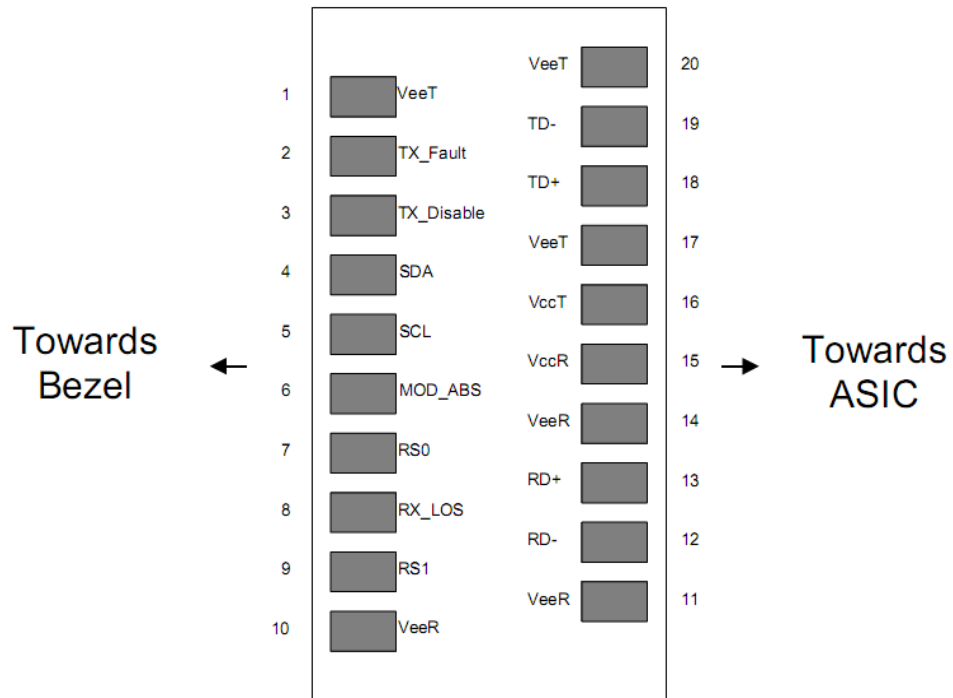
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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.



Pin Descriptions



Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1

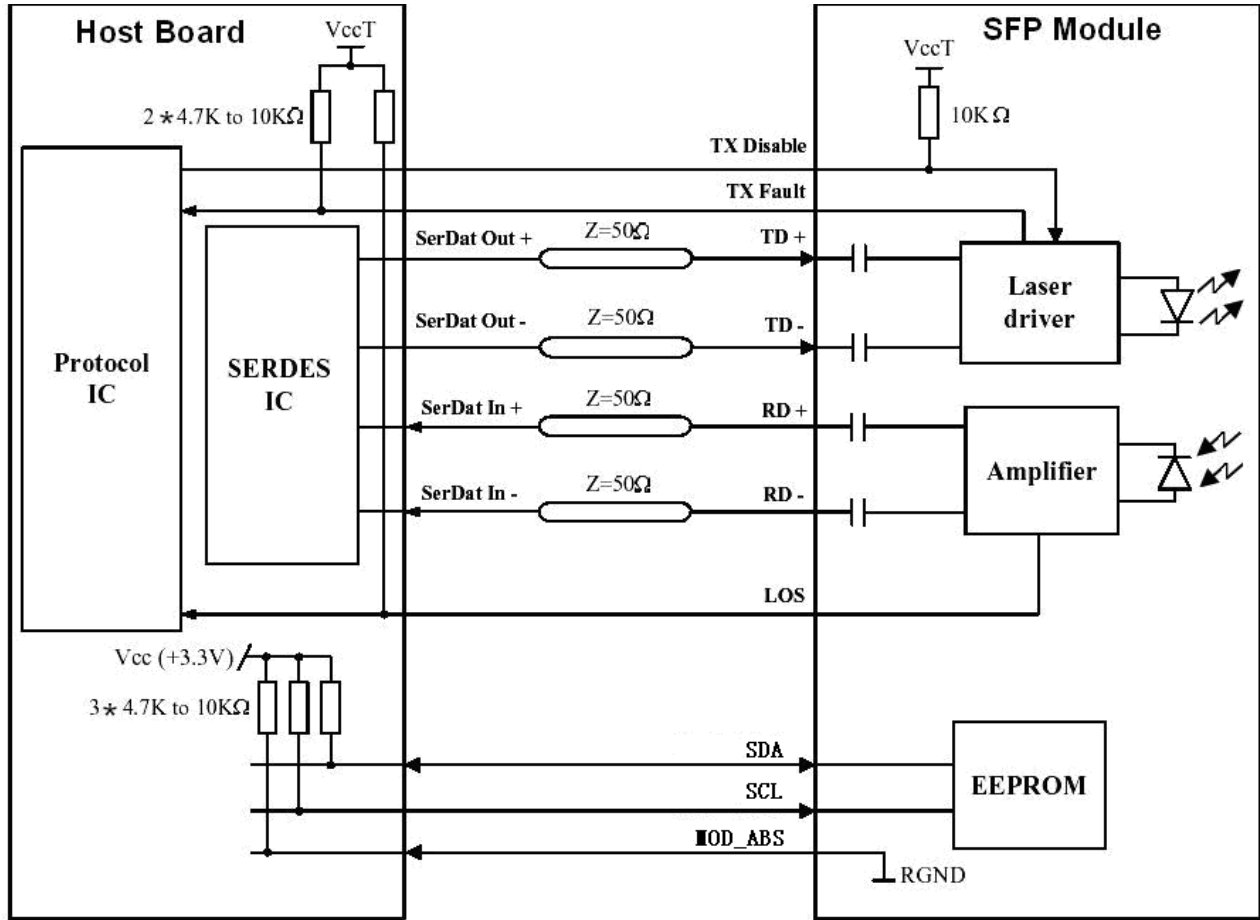
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V _{EER}	Receiver ground	1	
11	V _{EER}	Receiver ground	1	
12	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 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 Dimensions

