

**SPB-2880LWG / SPB-2880BLWG / SPB-2880ALWG****(RoHS Compliant)****10.3 Gbps / 80km / 1490 nm TX / 1550 nm RX Digital Diagnostic 1-Fiber SFP+ LC SM TRANSCEIVER****FEATURES**

- 1-Fiber Bi-Directional SFP+ Optical Transceiver
- Up to 10.3 Gb/s Bi-directional Data Links
- Compliant to SFP+ MSA
- Compliant to IEEE 802.3ae 10GBASE-BX
- SFF-8472 Digital Diagnostic Function
- Simplex LC Connector
- Temperature-stabilized 1490 nm EML Transmitter
- 1550 nm Receiver
- Distance up to 80 km
- AC/AC Coupling according to MSA
- Single +3.3 V Power Supply
- RoHS 6/6 Compliant
- 0 to 70°C Operating: SPB-2880LWG
- -10 to 85°C Operating: SPB-2880BLWG
- -40 to 85°C Operating: SPB-2880ALWG
- Class 1 Laser International Safety Standard IEC-60825 Compliant

**APPLICATIONS**

- 10G Ethernet Links

**DESCRIPTION**

The SPB-2880LWG series single mode transceiver is a small form factor pluggable module for bi-directional serial optical data communications such as IEEE 802.3ae 10GBASE-BX by using 1490 nm transmitter and 1550 nm receiver. It is with the SFP 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I<sup>2</sup>C series bus specified in the SFP MSA SFF-8472. The transmitter section uses temperature-stabilized 1490 nm laser (EML) and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated 1550 nm InGaAs avalanche photodiode preamplifier mounted in an optical header and a limiting post-amplifier IC.

**LASER SAFETY**

This single mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

**ORDER INFORMATION**

P/No.	Bit Rate (Gb/s)	10GBASE	Distance (km)	TX (nm)	RX (nm)	Package	Case Temp (°C)	RoHS Compliant
SPB-2880LWG	10.3	BX	80	1490 EML	1550	LC SFP+ with DMI	0 to 70	Yes
SPB-2880BLWG	10.3	BX	80	1490 EML	1550	LC SFP+ with DMI	-10 to 85	Yes
SPB-2880ALWG	10.3	BX	80	1490 EML	1550	LC SFP+ with DMI	-40 to 85	Yes

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Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Case Temperature	Topr	0	70	°C	SPB-2880LWG
		-10	85		SPB-2880BLWG
		-40	85		SPB-2880ALWG
Power Supply Voltage	Vcc	-0.5	3.6	V	
Receiver Input Power	Mip		-4	dBm	Average power

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Operating Case Temperature	Topr	0		70	°C / SPB-2880LWG
		-10		85	°C / SPB-2880BLWG
		-40		85	°C / SPB-2880ALWG
Relative Humidity	RH	0		85	% / Non-condensing
Power Supply Current	I <sub>CC (TX+RX)</sub>		350	500	mA/SPB-2880LWG
			350	650	mA/SPB-2880B(A)LWG
Data Rate			10.3125		Gb/s

Transmitter Optical Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Average Launch Power	P <sub>O, AVG</sub>	0		4	dBm	1
Extinction Ratio	ER	8.2			dB	
Output Center Wavelength	λ <sub>c</sub>	1480	1490	1500	nm	
Output Spectrum Width	Δλ	---		1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Average Launch Power of OFF Transmitter				-30	dBm	

1. Output power is power coupled into a 9/125 μm single-mode fiber.

Receiver Optical Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Sensitivity				-23	dBm	2
Receiver Overload	P <sub>MAX</sub>	-7	---		dBm	
LOS -- Deasserted	LOS <sub>D</sub>	---	---	-24	dBm	Transition: high to low
LOS -- Asserted	LOS <sub>A</sub>	-38	---	---	dBm	Transition: low to high
LOS Hysteresis	LOS <sub>H</sub>	0.5			dB	
Wavelength of Operation	λ <sub>c</sub>	1540		1560	nm	

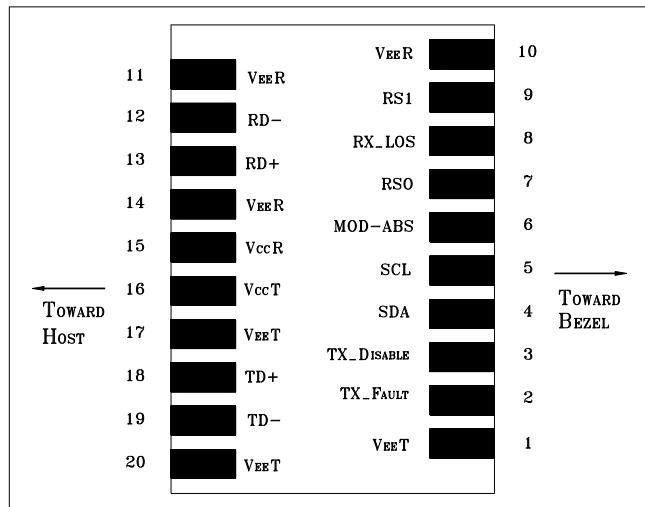
2. Measured with worst ER; BER < 10<sup>-12</sup> and PRBS 2<sup>31</sup>-1.

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Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Units	Notes
<b>High-Speed Signal (CML) Interface Specification</b>						
Input Data Rate			10.3125		Gb/s	
Differential Input Impedance	R <sub>in</sub>		100		Ω	
Differential Data Input Amplitude		120		820	mV <sub>pp</sub>	Internally AC coupled
Output Data Rate			10.3125		Gb/s	
Differential Output Impedance	R <sub>out</sub>		100		Ω	
Differential Data Output Amplitude		350	600	850	mV <sub>pp</sub>	Internally AC coupled
<b>Low-Speed Signal (LVTTTL) Interface Specification</b>						
Input High Voltage		2.0		V <sub>cc</sub> +0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		V <sub>cc</sub>	V	
Output Low Voltage		GND		0.5	V	

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CONNECTION DIAGRAM



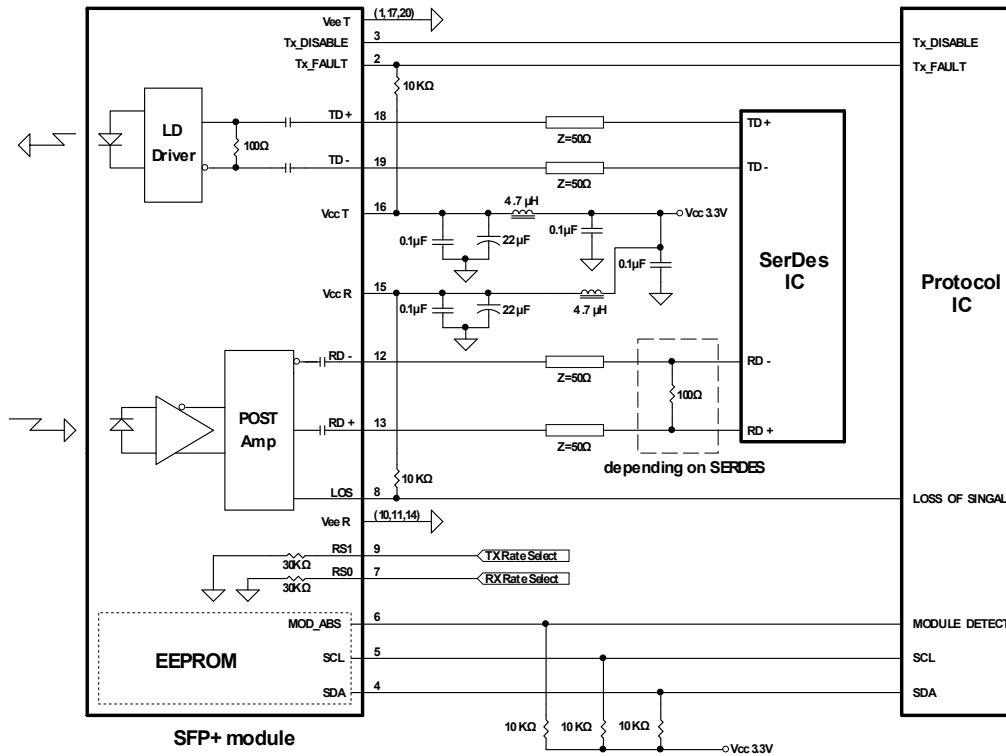
PIN	Signal Name	Description	PIN	Signal Name	Description
1	V <sub>EE</sub> T	Transmitter Signal Ground	11	V <sub>EE</sub> R	Receiver Signal Ground
2	TX_Fault	Transmitter Fault Indication. Logic “1” Output = Laser Fault. Logic “0” Output = Normal Operation	12	RD-	Inverse Receiver Data Out
3	TX_Disable	Logic “1” Input (or no connection) = Laser off, Logic “0” = Laser on.	13	RD+	Receiver Data Out
4	SDA	Modulation Definition 2 – Two wires serial ID Interface	14	V <sub>EE</sub> R	Receiver Signal Ground
5	SCL	Modulation Definition 1 – Two wires serial ID Interface	15	V <sub>CC</sub> R	Receiver Power – 3.3V±5%
6	MOD-ABS	Modulation Definition 0 – Ground in Module	16	V <sub>CC</sub> T	Transmitter Power – 3.3V±5%
7	RS0	RX Rate Select (LVTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	17	V <sub>EE</sub> T	Transmitter Signal Ground
8	RX_LOS	Loss of Signal Out (OC).	18	TD+	Transmitter Data In
9	RS1	TX Rate Select (LVTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	19	TD-	Inverse Transmitter Data In
10	V <sub>EE</sub> R	Receiver Signal Ground	20	V <sub>EE</sub> T	Transmitter Signal Ground

MODULE DEFINITION

Module Definition	PIN 4	PIN 5	PIN 6	Interpretation by Host
4	SDA	SCL	MOD-ABS	Serial module definition protocol

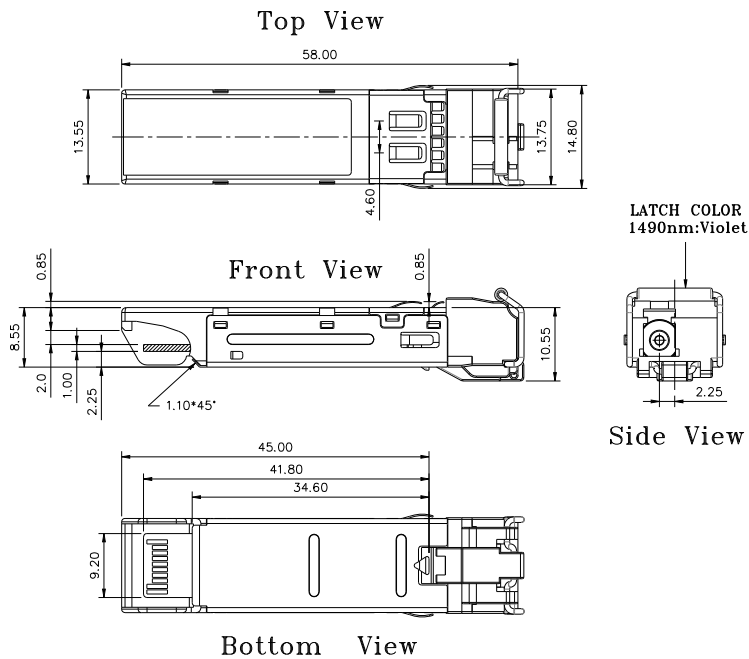
Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SDA and SCL appear as no connection (NC) and MOD-ABS is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E<sup>2</sup>PROM protocol of the ATMEL AT24C01A/02/04 family of components.

### RECOMMENDED CIRCUIT SCHEMATIC



### PACKAGE DIAGRAM

Units in mm



**Note:** Specifications subject to change without notice.

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**REVISION HISTORY**

Version	Subject	Release Date
1.0	Initial datasheet	2020/4/23