

Technical Datasheet

FTLF1419P1WCL-C

Finisar Coherent® Compatible 2GBase SFP Transceiver

Hot Pluggable, +3.3V, LC Duplex, 1310nm, up to 55km, Extended Temperature

FEATURES

- Up to 2.125Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Uncooled 1310nm DFB laser transmitter
- Duplex LC connector
- No Rate Select input required for
- Fibre Channel 1x/2x operation
- Up to 55 km on 9/125µm SMF
- Metal enclosure, for lower EMI
- Single 3.3V power supply
- Low power dissipation <700mW typical
- Extended operating temperature range: -10°C to 70°C
- RoHS compliant and Lead Free

APPLICATIONS

- 1.25Gb/s 1000Base-LX Ethernet
- Dual Rate 1.06 / 2.125 Gb/s FC

DESCRIPTION

ATGBICS® Compatible FTLF1419P1WCL-C Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). They simultaneously comply with Gigabit Ethernet as specified in IEEE Std 802.3, and 1x and 2x Fibre Channel as defined in FC-P1 13.0. They are RoHS compliant and lead-free per Directive 2002/95/EC. Digital diagnostics functions are available via the 2-wire serial bus specified in the SFP MSA.

Technical Datasheet

Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault. Not supported.	
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
10	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	
16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
3. Should be pulled up with 4.7k - 10 kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. Operates between OC-3 and OC-48, 1x and 2x Fibre Channel, and Gigabit Ethernet data rates and respective protocols without active control. Operates at 1x and 2x Fibre Channel, and Gigabit Ethernet data rates and respective protocols without active control.
5. LOS is open collector output. Should be pulled up with 4.7k – 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Technical Datasheet

Pin Description Diagram

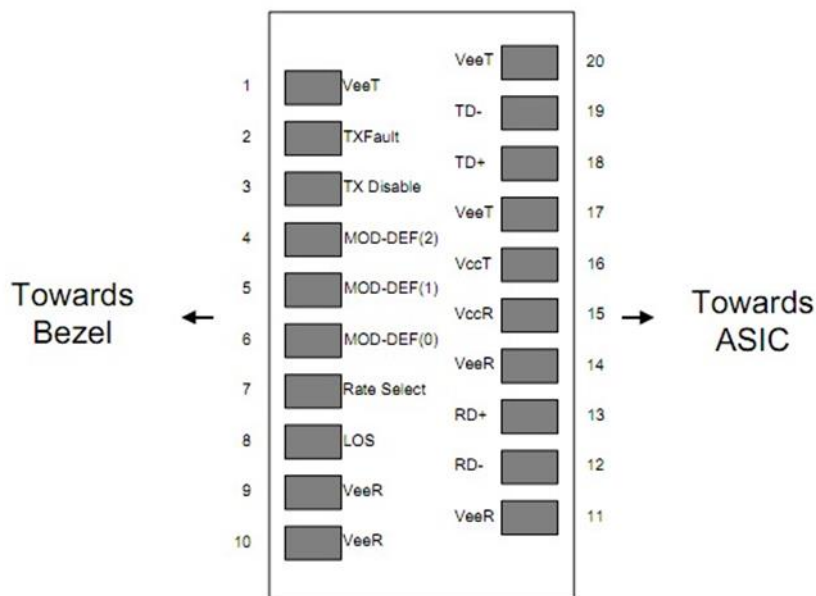


Diagram of Host Board Connector Block Pin Numbers and Names

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		4.5	V	
Storage Temperature	T _S	-40		85	°C	
Case Operating Temperature	T _{OP}	-10		70	°C	
Relative Humidity	RH	0		85	%	1

Technical Datasheet

Electrical Characteristics (TOP = -10 to 70 °C, VCC = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.00		3.60	V	
Supply Current	Icc		200	300	mA	
Transmitter						
Input differential impedance	Rin		100		Ω	2
Single ended data input swing	Vin,pp	250		1200	mV	
Transmit Disable Voltage	VD	Vcc – 1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	3
Transmit Disable Assert Time				10	us	
Receiver						
Single ended data output swing	Vout,pp	300	400	800	mV	4
Data output rise time	tr		100	175	ps	5
Data output fall time	tf		100	175	ps	5
LOS Fault	VLOS fault	Vcc – 0.5		VccHO ST	V	6
LOS Normal	VLOS norm	Vee		Vee+0.5	V	6
Power Supply Rejection	PSR	100			mVpp	7
Deterministic Jitter Contribution	RX Δ DJ			51.7	ps	8
Total Jitter Contribution	RX Δ TJ			122.4	ps	

Notes:

1. Non-condensing.
2. Connected directly to TX data input pins. AC coupled thereafter.
3. Or open circuit.
4. Into 100-ohm differential termination.
5. 20 – 80 %
6. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
7. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.
8. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and Δ DJ.

Technical Datasheet

Optical Characteristics (TOP = -10 to 70 °C, VCC = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	POUT	0		5	dBm	1
Optical Wavelength	λ	1275		1350	nm	2
Spectral Width (-20dB)	σ			1	nm	2
Optical Modulation Amplitude	OMA	174			μ W	2,3
Sidemode Suppression Ratio	SSR	30			dB	
Optical Rise/Fall Time	t_r / t_f			160	ps	4
Relative Intensity Noise	RIN			-120	dB/Hz	
Optical Extinction Ratio	ER	9			dB	
Deterministic Jitter Contribution	TX Δ DJ			56.5	ps	5
Total Jitter Contribution	TX Δ TJ			119	ps	
Receiver						
Average Rx Sensitivity @ 2.125 Gb/s (2X Fibre Channel)	RSENS 1			-21	dBm	6, 7
Average Rx Sensitivity @ 1.25 Gb/s (Gigabit Ethernet)	RSENS 2			-22	dBm	6, 7
Average Rx Sensitivity @ 1.06 Gb/s (1X Fibre Channel)	RSENS 1			-22	dBm	6, 7
Maximum Input Power	P _{MAX}	0			dBm	
Receiver Elec. 3 dB cutoff freq.				1500	MHz	
Optical Center Wavelength	λ_C	1270		1600	nm	
Return Loss		12			dB	
LOS De-Assert	LOSD		-23	-19	dBm	
LOS Assert	LOSA	-30	-25		dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. Meets curves in FC-PI 13.0 Figures 18 and 19, which allow trade-off between wavelength, spectral width and OMA.
3. Equivalent extinction ratio specification for Fibre Channel. Allows smaller ER at higher average power.
4. Unfiltered, 20-80%. Complies with FC 1x and 2x eye mask when filtered.
5. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and Δ DJ.
6. Measured with conformance signals defined in FC-PI 13.0 specifications.
7. As measured with 9dB extinction ratio. Measured with a PRBS 2⁷-1 test pattern.

Technical Datasheet

General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Data Rate	BR	1062		212 5	Mb/ sec	1
Bit Error Rate	BER			10 ⁻¹²		2
Max. Supported Link Length on 9/125µm SMF @ 2X Fibre Channel	L _{MAX1}		52.5		k m	3, 4
Max. Supported Link Length on 9/125µm SMF @ Gigabit Ethernet	L _{MAX2}		55		k m	3, 4

Notes:

1. Gigabit Ethernet and 1x/2x Fibre Channel compliant.
2. Tested with a PRBS 2⁷-1 test pattern.
3. Dispersion limited per FC-PI Rev. 13
4. Attenuation of 0.40 dB/km is used for the link length calculations. Distances are indicative only.
Please refer to the Optical Specifications in Table IV to calculate a more accurate link budget based on specific conditions in your application.

Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T _{op}	-10		70	°C	
Storage Temperature	T _{sto}	-40		85	°C	

Regulatory Compliance

ATGBICS® transceivers are Class 1 Laser Products and comply with US FDA regulations. These products are certified by TÜV and CSA to meet the Class 1 eye safety requirements of EN (IEC) 60825 and the electrical safety requirements of EN (IEC) 60950.

Technical Datasheet

Digital Diagnostic Functions

This transceiver supports the 2-wire serial communication protocol as defined in the SFP MSA.

The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, it provides a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

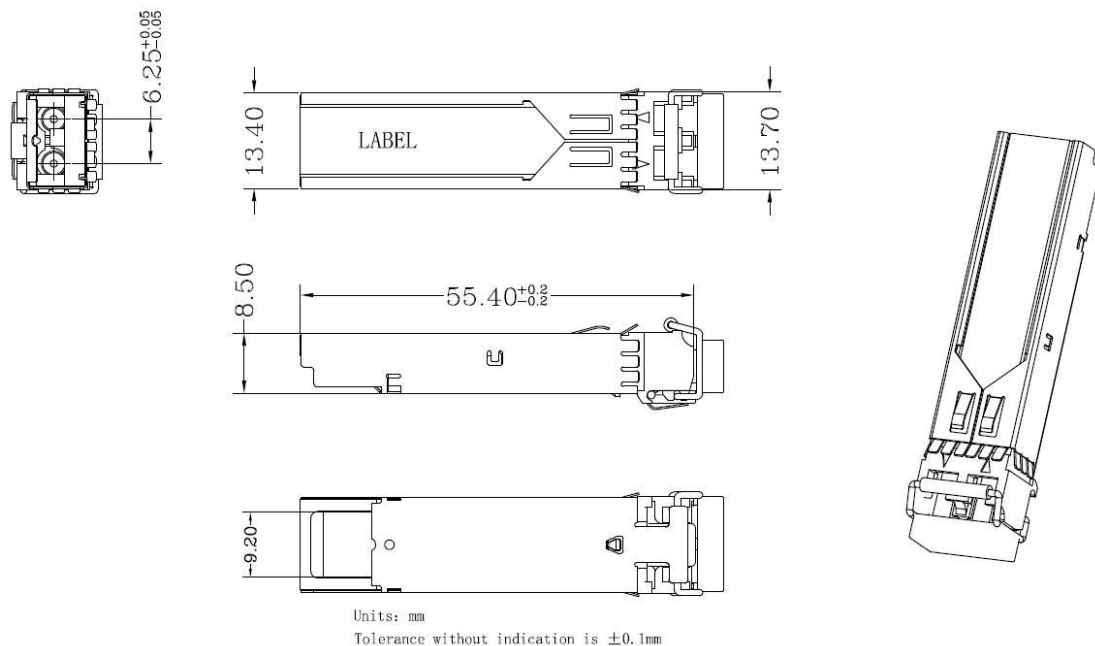
The SFP MSA defines a 256-byte memory map in EPROM that is accessible over a 2-wire serial interface at the 8-bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8-bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E²PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

Technical Datasheet

Mechanical Specifications

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



PCB Layout and Bezel Recommendations

