

## Product Datasheet

### FTLF8524P3BNL-C

#### Finisar® Compatible 3.7Gb/s SFP+ Transceiver

Hot Pluggable, Duplex LC, +3.3V, 850nm, VCSEL MMF 300m DDM -40~85°C

#### FEATURES

- Up to 3.7Gbps
- Hot-Pluggable
- Duplex LC connector
- 850nm VCSEL transmitter
- Up to 300m with 62.5/125µm on MMF
- 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface
- SFP MSA SFF-8074i compliant
- Power Supply: +3.3V
- Power consumption<1W
- Temperature Range:
  - Operation Temperature: -40~85°C
  - Storage Temperature: -40~85°C
- RoHS compliant

#### APPLICATIONS

- Wireless and cellular base station system interconnect
- OBSAI
- CPRI
- LTE
- Other Optical Links

#### DESCRIPTION

ATGBICS® Compatible FTLF8524P3BNL multi-mode transceiver is small form factor pluggable module for serial optical data communications such as Wireless and cellular base station system inter-connect. It is with the SFP 20-pin connector to allow hot plug capability. This module is designed for multi-mode fiber and operates at a nominal wavelength of 850 nm. The transmitter section uses a Vertical Cavity Surface Emitted Laser (VCSEL) and is a Class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated GaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

## Product Datasheet

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	$T_s$	-40		85	°C
Case Operating Temperature	$T_A$	-40		85	°C
Maximum Supply Voltage	$V_{CC}$	-0.5		4	V
Relative Humidity	RH	0		85	%

### Electrical Characteristics ( $T_{OP} = -40$ to $85$ °C, $V_{CC} = 3.135$ to $3.465$ Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	$V_{CC}$	3.135		3.465	V	
Supply Current	$I_{CC}$			250	mA	
Power Consumption	P			1	W	
<b>Transmitter Section:</b>						
Input differential impedance	$R_{in}$		100		$\Omega$	1
Tx Input Single Ended DC Voltage Tolerance (Ref VeeT)	V	-0.3		4	V	
Differential input voltage swing	$V_{in,pp}$	180		700	mV	2
Transmit Disable Voltage	$V_D$	2		$V_{CC}$	V	3
Transmit Enable Voltage	$V_{EN}$	Vee		Vee+0.8	V	
<b>Receiver Section:</b>						
Single Ended Output Voltage Tolerance	V	-0.3		4	V	
Rx Output Diff Voltage	$V_o$	300		850	mV	
Rx Output Rise and Fall Time	$T_r/T_f$	30			ps	4
LOS Fault	$V_{LOS\ fault}$	2		$V_{CC\ HOST}$	V	5
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+0.8	V	5

#### Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Per SFF-8431 Rev 3.0
3. Into 100 ohms differential termination.
4. 20%~80%
5. LOS is an open collector output. Should be pulled up with 4.7k – 10k $\Omega$  on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

## Product Datasheet

Optical Parameters ( $T_{OP} = -0$  to  $85^{\circ}\text{C}$ ,  $V_{CC} = 3.135$  to  $3.465$  Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
<b>Transmitter Section:</b>						
Center Wavelength	$\lambda_t$	840	850	860	nm	
RMS spectral width	$\lambda_{RMS}$			4	nm	
Average Optical Power	$P_{avg}$	-9		0	dBm	1
Optical Power OMA	$P_{oma}$		-1.5		dBm	
Laser Off Power	$P_{off}$			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Transmitter Dispersion Penalty	TDP			3.9	dB	2
Relative Intensity Noise	$R_{in}$			-128	dB/Hz	3
Optical Return Loss Tolerance		20			dB	
<b>Receiver Section:</b>						
Center Wavelength	$\lambda_r$	840		860	nm	
Receiver Sensitivity (OMA)	$S_{en}$			-12.1	dBm	4
Stressed Sensitivity (OMA)	$S_{en_{ST}}$			-12.5	dBm	4
Los Assert	$LOS_A$	-30		-	dBm	
Los Dessert	$LOS_D$			-12	dBm	
Los Hysteresis	$LOS_H$	0.5			dB	
Overload	Sat	1			dBm	5
Receiver Reflectance	$R_{rx}$			-12	dB	

Notes:

1. Average power figures are informative only, per IEEE802.3ae.
2. TWDP figure requires the host board to be SFF-8431 compliant. TWDP is calculated using the Matlab code provided in clause 68.6.6.2 of IEEE802.3ae.
3. 12dB reflection.
4. Conditions of stressed receiver tests per IEEE802.3ae. CSRS testing requires the host board to be SFF-8431 compliant.
5. Receiver overload specified in OMA and under the worst comprehensive stressed condition.

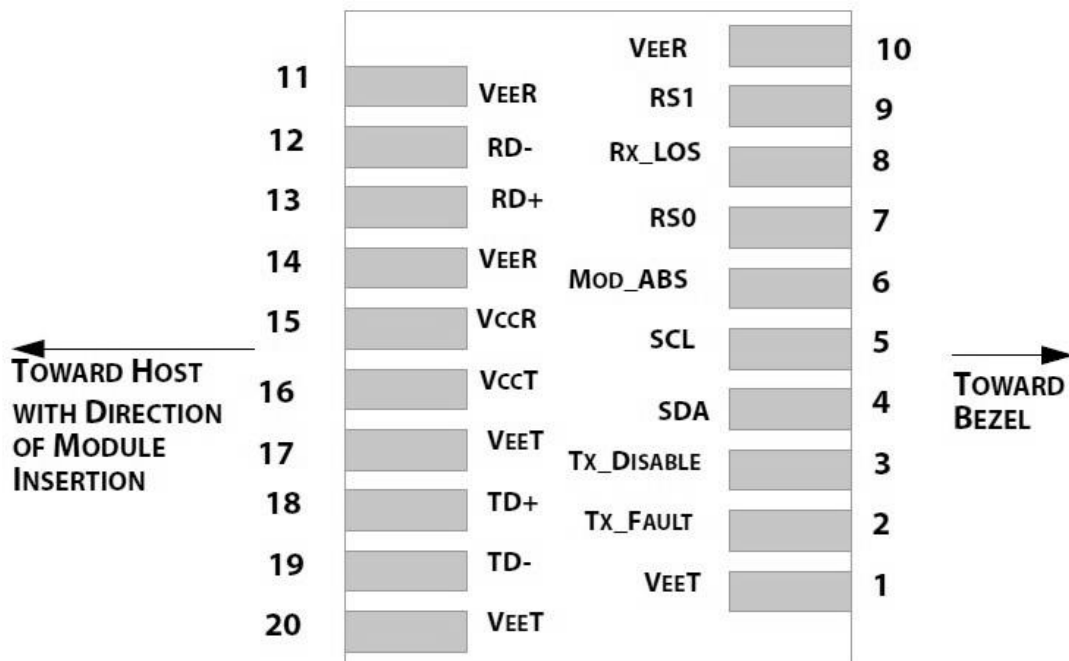
## Product Datasheet

### Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			10	us
TX_Disable Negate Time	t_on			1	ms
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms
TX_FAULT from Fault to Assertion	t_fault			100	us
TX_Disable Time to Start Reset	t_reset	10			us
Receiver Loss of Signal Assert Time	T <sub>A,RX_LOS</sub>			100	us
Receiver Loss of Signal Deassert Time	T <sub>d,RX_LOS</sub>			100	us
Rate-Select Chage Time	t_ratesel			10	us
Serial ID Clock Time	t_serial-clock			100	kHz

### Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



## Product Datasheet

### Pin Function Definitions

PIN No	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Not Connected, Function not available	
8	LOS	Receiver Loss of Signal Indication	4
9	RS1	Rate select1, optionally control SFP transmitter. When high, input data rate >3.7Gb/s; when low, input data rate <=3.7Gb/s	
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	1

#### Notes:

1. The module ground pins shall be isolated from the module case.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.
3. This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.

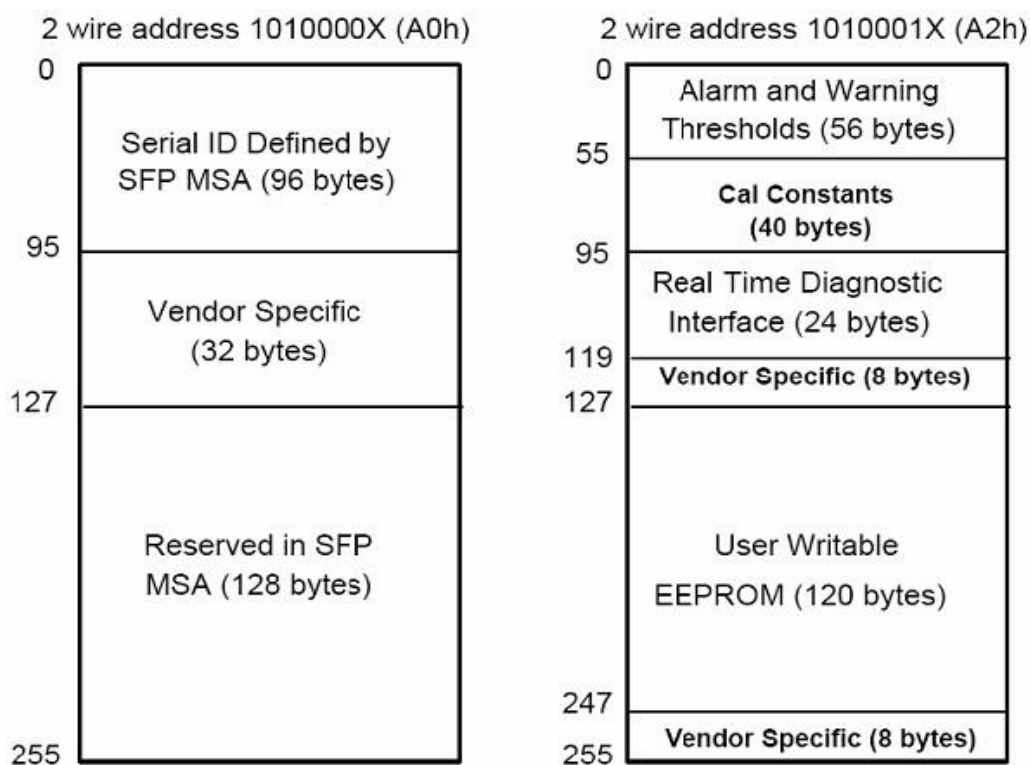
### SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I<sup>2</sup>C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers".

## Product Datasheet

The DDM parameters have been internally calibrated.

Table 1 - Digital Diagnostic Memory Map (Specific Data Field Descriptions)



## Product Datasheet

Table 2 - EEPROM Serial ID Memory Contents (A0h)

Data Address	Length (Byte)	Name of Length	Description and Contents
<b>Base ID Fields</b>			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	Transmitter Code
11	1	Encoding	8B/10B
12	1	BR, Nominal	3.7Gbs
13-14	2	Reserved	(0000h)
15	1	Length(9um)	
16	1	Length(50um)	Link length supported for 50/125um by fiber 250m on OM2 @3.1Gbit/sec
17	1	Length(62.5um)	Link length supported for 62.5/125um by fiber 300m @3.7Gbit/sec
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Length(OM3)	Link length supported for 50/125um by fiber 300m on OM3 @3.7Gbit/sec
20-35	16	Vendor Name	SFP vendor name: ATGBICS
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "FTLF8524P3BNL-C" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
<b>Extended ID Fields</b>			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	OEM's Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
<b>Vendor Specific ID Fields</b>			

## Product Datasheet

<b>96-127</b>	32	Readable	OEM specific date, read only
<b>128-255</b>	128	Reserved	Reserved for SFF-8079

### Digital Diagnostic Monitor Characteristics

Data Address	Parameter	Accuracy	Unit
<b>96-97</b>	Transceiver Internal Temperature	±3.0	°C
<b>98-99</b>	VCC3 Internal Supply Voltage	±3.0	%
<b>100-101</b>	Laser Bias Current	±10	%
<b>102-103</b>	Tx Output Power	±3.0	dBm
<b>104-105</b>	Rx Input Power	±3.0	dBm

### Regulatory Compliance

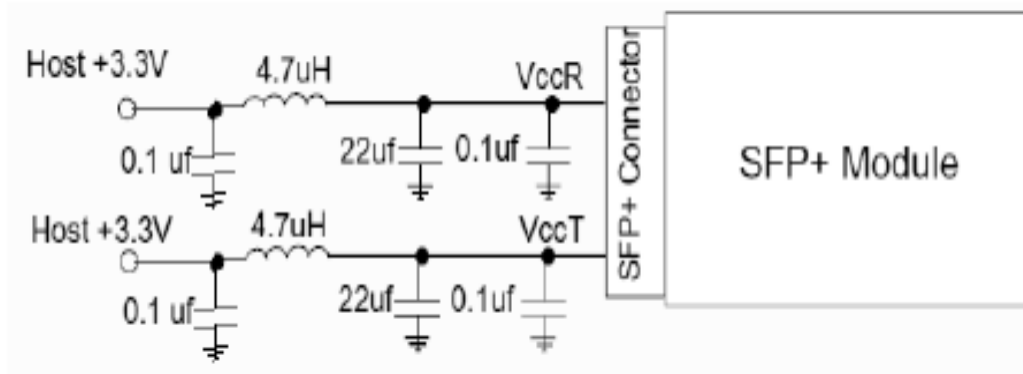
ATGBICS FTLF8524P3BNL-C complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

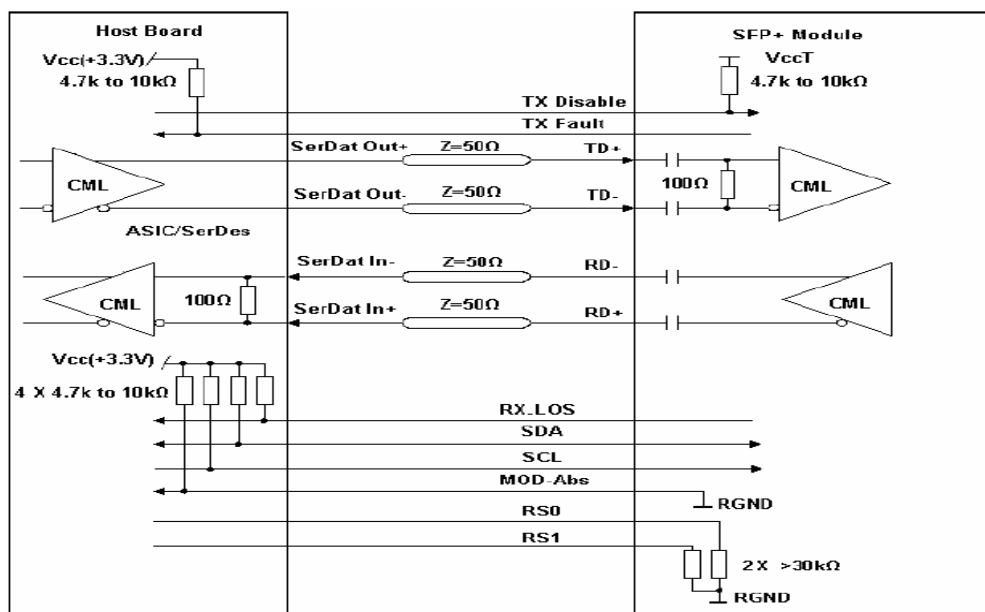


## Product Datasheet

### Recommended Circuit



**Recommended Host Board Power Supply Circuit**



**Recommended High-speed Interface Circuit**

## Product Datasheet

### Mechanical Dimensions

