

# 10GBASE-LR SFP+ 1310nm 10km DOM Transceiver

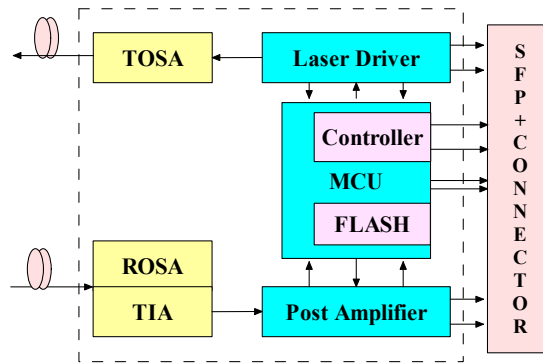
HFBR-5720ALP-LL



## Application

- 10GBASE-LR/LW 10G Ethernet
- 10GFC
- 8GFC

## Product Function



## Product Specifications

### I. Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
<b>Storage Temperature Range</b>	Ts	°C	-40	85
<b>Relative Humidity</b>	RH	%	0	95
<b>Supply Voltage</b>	VCC	V	-0.3	4.0

### II. Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
<b>Operating Case Temperature Range</b>	Tc	°C	0		70
<b>Power Supply Voltage</b>	Vcc	V	3.135	3.3	3.465
<b>Bit Rate</b>	BR	Gb/s	8.5		10.52
<b>Bit Error Ratio</b>	BER				10 <sup>-12</sup>
<b>Max Supported Link Length</b>	L	km			10

### III. Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
<b>Supply Voltage</b>	$V_{CC}$	V	3.135	3.3	3.465	
<b>Supply Current</b>	$I_{CC}$	mA			315	
<b>Transmitter</b>						
<b>Input Differential Impedance</b>	RIN	$\Omega$	80	100	120	1
<b>Differential Data Input Swing</b>	VIN	mVp-p	190		700	
<b>Transmit Disable Voltage</b>	VDIS	V	2		$V_{CCHOST}$	
<b>Transmit Enable Voltage</b>	VEN	V	$V_{EE}$		$V_{EE}+0.8$	
<b>Transmit Fault Assert Voltage</b>	VFA	V	2.2		$V_{CCHOST}$	
<b>Transmit Fault De-Assert Voltage</b>	VFDA	V	$V_{EE}$		$V_{EE}+0.4$	
<b>Receiver</b>						
<b>Differential Data Output Swing</b>	VOD	mVp-p	300		850	
<b>LOS Fault</b>	VLOSFT	V	2.2		$V_{CCHOST}$	
<b>LOS Normal</b>	VLOSNR	V	$V_{EE}$		$V_{EE}+0.4$	

**Note:**

1. Differential between TD+ / TD-

## IV. Optical Characteristics

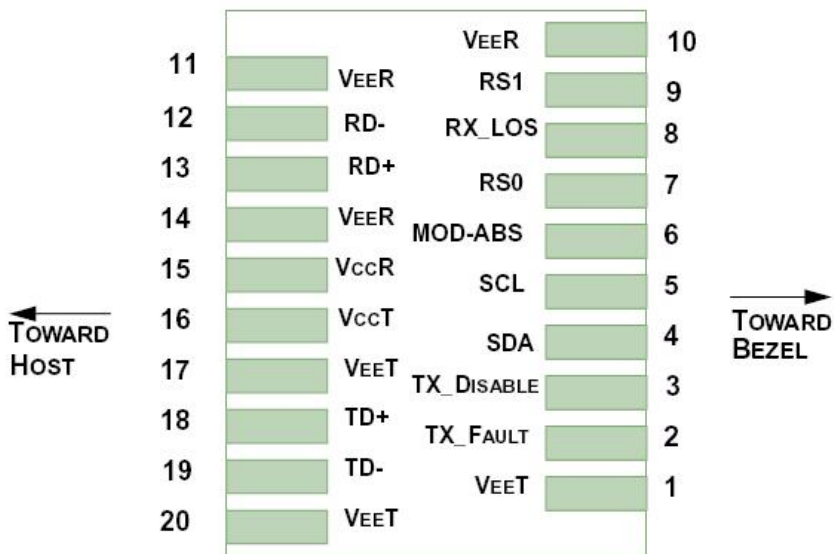
Parameter	Min	Typ	Max	Units	Note
<b>Transmitter</b>					
<b>Nominal Wavelength</b>	1260	1310	1355	nm	
<b>Side Mode Suppression Ratio</b>	30			dB	
<b>Optical Modulation Amplitude</b>	-5.2			dBm	
<b>Optical Output Power</b>	-8.2		0.5	dBm	
<b>Extinction Ratio</b>	3.5			dB	
<b>Transmitter and Dispersion Penalty</b>			3.2	dB	
<b>Average launch power of OFF transmitter</b>			-30	dBm	
<b>Relative Intensity Noise</b>			-128	dB/Hz	
<b>Optical Return Loss Tolerance</b>			12	dB	
<b>Spectral width</b>			1	nm	
<b>Receiver</b>					
<b>Center Wavelength</b>	1260		1355	nm	
<b>Average Receiver Power</b>	-14.4		+0.5	dBm	1
<b>Receiver Sensitivity (OMA)</b>			-12.6	dBm	1
<b>Stressed Receiver Sensitivity (OMA)</b>			-10.3	dBm	2

<b>Max Input power</b>	1.5			dBm	
<b>Receiver Reflectance</b>			-12	dB	
<b>Assert LOS</b>	-30			dBm	
<b>De-Assert LOS</b>			-16	dBm	
<b>LOS Hysteresis</b>	0.5			dB	

**Note:**

1. Sensitivity for 10G PRBS 2<sup>31</sup>-1 and BER better than or equal to 10E-12
2. The stressed sensitivity value in the table are for system level BER measurements which include the effects of CDR circuit.

### V. Pin function definitions



Pin Number	Symbol	Name	Description
1,17,20	VeeT	Transmitter Signal Ground	These pins should be connected to signal ground on the host board.
2	TX Fault	Transmitter Fault Out (OC)	Logic "1" Output = Laser Fault (Laser off before t_fault) Logic "0" Output = Normal Operation This pin is open collector compatible, and should be pulled up to Host Vcc with a 10kΩ resistor.
3	TX Disable	Transmitter Disable In (LVTTTL)	Logic "1" Input (or no connection) = Laser off Logic "0" Input = Laser on This pin is internally pulled up to VccT with a 10 kΩ resistor.
4	SDA	Module Definition Identifiers	Module Definition pins should be pulled up to Host Vcc with 10 kΩ resistors.
5	SCL		
6	MOD-ABS		
7	RS0	Receiver Rate Select (LVTTTL)	These pins have an internal 33kΩ pull-down to ground. A signal on either of these pins will not affect module performance.
9	RS1	Transmitter Rate Select (LVTTTL)	
8	LOS	Loss of Signal Out (OC)	Sufficient optical signal for potential BER < 1x10 <sup>-12</sup> = Logic "0" Insufficient optical signal for potential BER < 1x10 <sup>-12</sup> = Logic "1" This pin is open collector compatible, and should be pulled up to Host Vcc with a 10kΩ resistor.
10,11,14	VeeR	Receiver Signal Ground	These pins should be connected to signal ground on the host board.
12	RD-	Receiver Negative DATA Out(CML)	Light on = Logic "0" Output Receiver DATA output is internally AC coupled and series terminated with a 50Ω resistor.

13	RD+	Receiver Positive DATA Out(CML)	Light on = Logic "1" Output Receiver DATA output is internally AC coupled and series terminated with a 50Ω resistor.
15	VccR	Receiver Power Supply	This pin should be connected to a filtered +3.3V power supply on the host board. See Figure 3.Recommended power supply filter
16	VccT	Transmitter Power Supply	This pin should be connected to a filtered +3.3V power supply on the host board. See Figure 3.Recommended power supply filter
18	TD+	Transmitter Positive DATA In(CML)	Logic "1" Input = Light on Transmitter DATA inputs are internally AC coupled and terminated with a differential 100Ω resistor.
19	TD-	Transmitter Negative DATA In(CML)	Logic "0" Input = Light on Transmitter DATA inputs are internally AC coupled and terminated with a differential 100Ω resistor.

## VI. ENVIRONMENTAL SAFETY

Compliant to ROHS6

## VII. DIGITAL DIAGNOSTIC INTERFACE DEFINITION

The 2-wire serial interface addresses of the SFP+ module are 1010000x (A0h) and 1010001x (A2h).

