

**Свойства**

передача данных по одному волокну

1490нм DFB лазер, 1310нм PIN фотоприемник

до 20км на 9/125 мкм одномодовом оптическом кабеле

до 1.25Gbps

цифровая диагностика (DDMI)

SC коннектор

**Применение**

Gigabit Ethernet

STM-4

● **Максимальные параметры**

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T <sub>s</sub>	-40		+85	°C
Supply Voltage	V <sub>CC</sub> T, R	-0.5		4	V
Relative Humidity	RH	0		85	%
Case Operating Temperature	T <sub>op</sub>	-5		+70	°C

● **Рекомендованные параметры**

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	T <sub>c</sub>	-5		+70	°C
Supply Voltage	V <sub>CC</sub> T, R	3.0		3.6	V
Power Supply Rejection		100			mV <sub>p-p</sub>

● **Электрические характеристики**

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	V <sub>CC</sub>	3.0	3.30	3.60	V	
Supply Current	I <sub>CC</sub>		160	280	mA	
Inrush Current	I <sub>surge</sub>			I <sub>CC</sub> +30	mA	
Maximum Power	P <sub>max</sub>			1.0	W	
<b>Transmitter Section:</b>						
Input differential impedance	R <sub>in</sub>	90	100	110	Ω	1
Single ended data input swing	V <sub>in PP</sub>	200		1200	mVp-p	
Transmit Disable Voltage	V <sub>D</sub>	V <sub>CC</sub> – 1.3		V <sub>CC</sub>	V	2
Transmit Enable Voltage	V <sub>EN</sub>	V <sub>EE</sub>		V <sub>EE</sub> + 0.8	V	
Transmit Disable Assert Time	T <sub>dessert</sub>			10	us	
<b>Receiver Section:</b>						
Single ended data output swing	V <sub>out,pp</sub>	300		1000	mv	3
Data output rise time	t <sub>r</sub>			150	ps	4
Data output fall time	t <sub>f</sub>			150	ps	4
LOS Fault	V <sub>losfault</sub>	V <sub>CC</sub> – 0.5		V <sub>CC_host</sub>	V	5
LOS Normal	V <sub>los norm</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6

Note:

1. AC coupled.
2. Or open circuit.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.

● Оптические параметры

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
<b>Transmitter Section:</b>						
Center Wavelength	$\lambda_c$	1470	1490	1510	nm	
Spectral Width	$\sigma$			1	nm	
Sidemode Supression ratio	SSR <sub>min</sub>	30			dB	
Optical Output Power	P <sub>out</sub>	-9		-3	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time	t <sub>r</sub> / t <sub>f</sub>			260	ps	2
Relative Intensity Noise	RIN			-120	dB/Hz	
Total Jitter Contribution	TX $\Delta$ TJ			0.284	UI	3
Eye Mask for Optical Output	Compliant with IEEE802.3 z (class 1 laser safety)					
<b>Receiver Section:</b>						
Optical Input Wavelength	$\lambda_c$	1250	1310	1350	nm	
Receiver Overload	P <sub>ol</sub>	-3			dBm	4
RX Sensitivity	Sen			-23	dBm	4
RX_LOS Assert	LOS <sub>A</sub>	-40			dBm	
RX_LOS De-assert	LOS <sub>D</sub>			-24	dBm	
RX_LOS Hysteresis	LOS <sub>H</sub>	0.5			dB	
<b>General Specifications:</b>						
Data Rate	BR		1.25		Gb/s	
Bit Error Rate	BER			10 <sup>-12</sup>		
Max. Supported Link Length on	L <sub>MAX</sub>		20		km	

9/125µm SMF@1.25Gb/s						
Total System Budget	LB	14			dB	

Note

1. The optical power is launched into SMF.
2. 20-80%.
3. Contributed total jitter is calculated from DJ and RJ measurements using  $TJ = RJ + DJ$ . Contributed RJ is calculated for  $1 \times 10^{-12}$  BER by multiplying the RMS jitter (measured on a single rise or fall edge) from the oscilloscope by 14. Per FC-PI (Table 9 - SM jitter output, note 1), the actual contributed RJ is allowed to increase above its limit if the actual contributed DJ decreases below its limits, as long as the component output DJ and TJ remain within their specified FC-PI maximum limits with the worst case specified component jitter input.
4. Measured with PRBS  $2^{7-1}$  at  $10^{-12}$  BER

● **Цифровая диагностика (DDMI)**

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

● **Блок-схема**

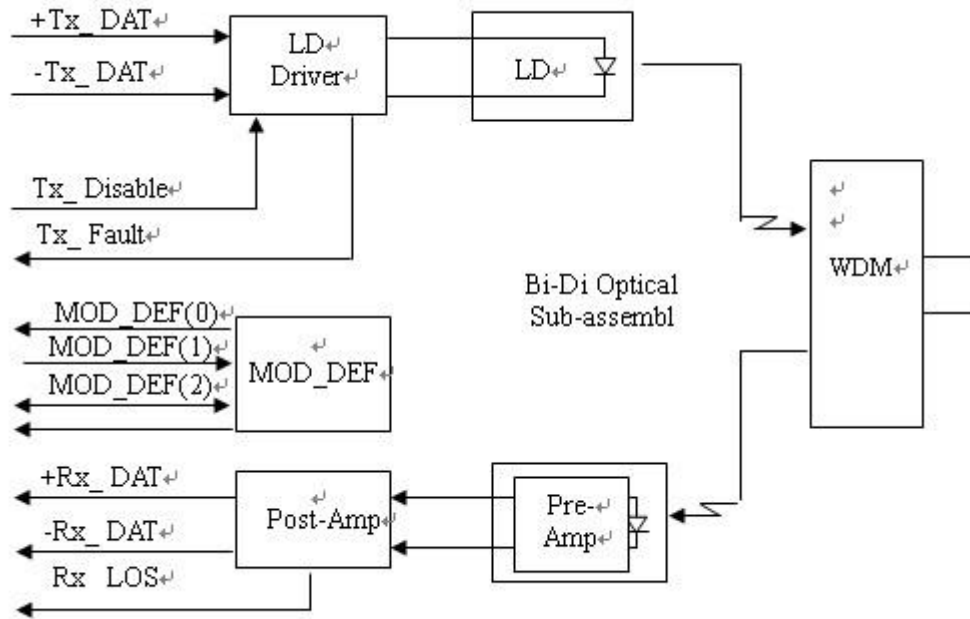


Figure1: Block Diagram

● Назначение контактов

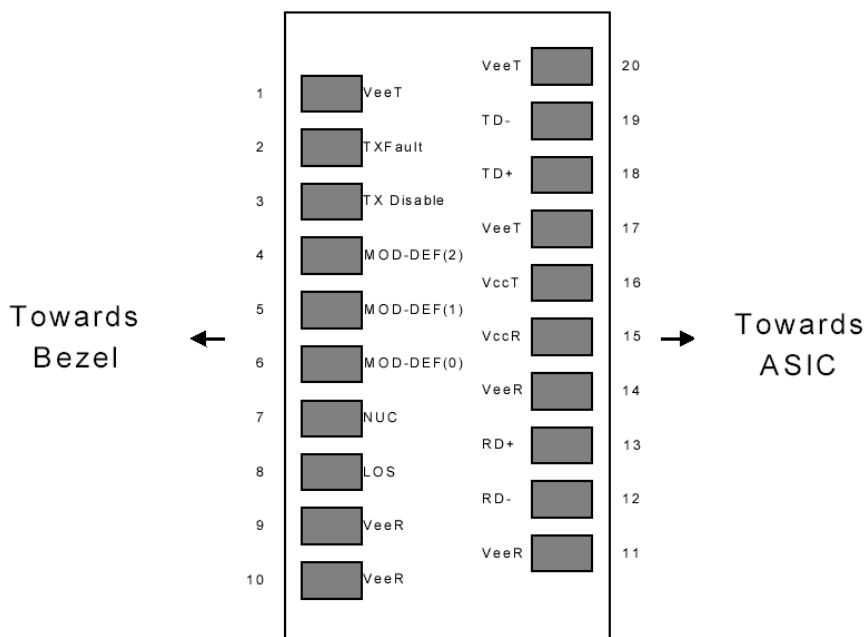


Figure2:Diagram of Host Board Connector Block Pin Numbers and Names

● Описание контактов

Pin No	Name	Function	Plug Seq	Notes
1	VeeT	Transmitter Ground	1	1
2	TX Fault	Transmitter Fault Indication	3	
3	TX Disable	Transmitter Disable	3	2
4	MOD-DEF2	Module Definition	2	3
5	MOD-DEF1	Module Definition 1	3	3
6	MOD-DEF0	Module Definition 0	3	3
7	Rate Select	Not Connected	3	4
8	LOS	Loss of Signal	3	5
9	VeeR	Receiver Ground	1	1
10	VeeR	Receiver Ground	1	1
11	VeeR	Receiver Ground		1

<b>12</b>	RD-	Inv. Received Data Out	<b>3</b>	<b>6</b>
<b>13</b>	RD+	Received Data Out	<b>3</b>	<b>6</b>
<b>14</b>	VeeR	Receiver Ground	<b>3</b>	<b>1</b>
<b>15</b>	VccR	Receiver Power	<b>2</b>	<b>1</b>
<b>16</b>	VccT	Transmitter Power	<b>2</b>	
<b>17</b>	VeeT	Transmitter Ground	<b>1</b>	
<b>18</b>	TD+	Transmit Data In	<b>3</b>	<b>6</b>
<b>19</b>	TD-	Inv. Transmit In	<b>3</b>	<b>6</b>
<b>20</b>	VeeT	Transmitter Ground	<b>1</b>	

**Notes:**

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <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. Rate select is not used
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.
6. AC Coupled

● **Рекомендованная схема включения**

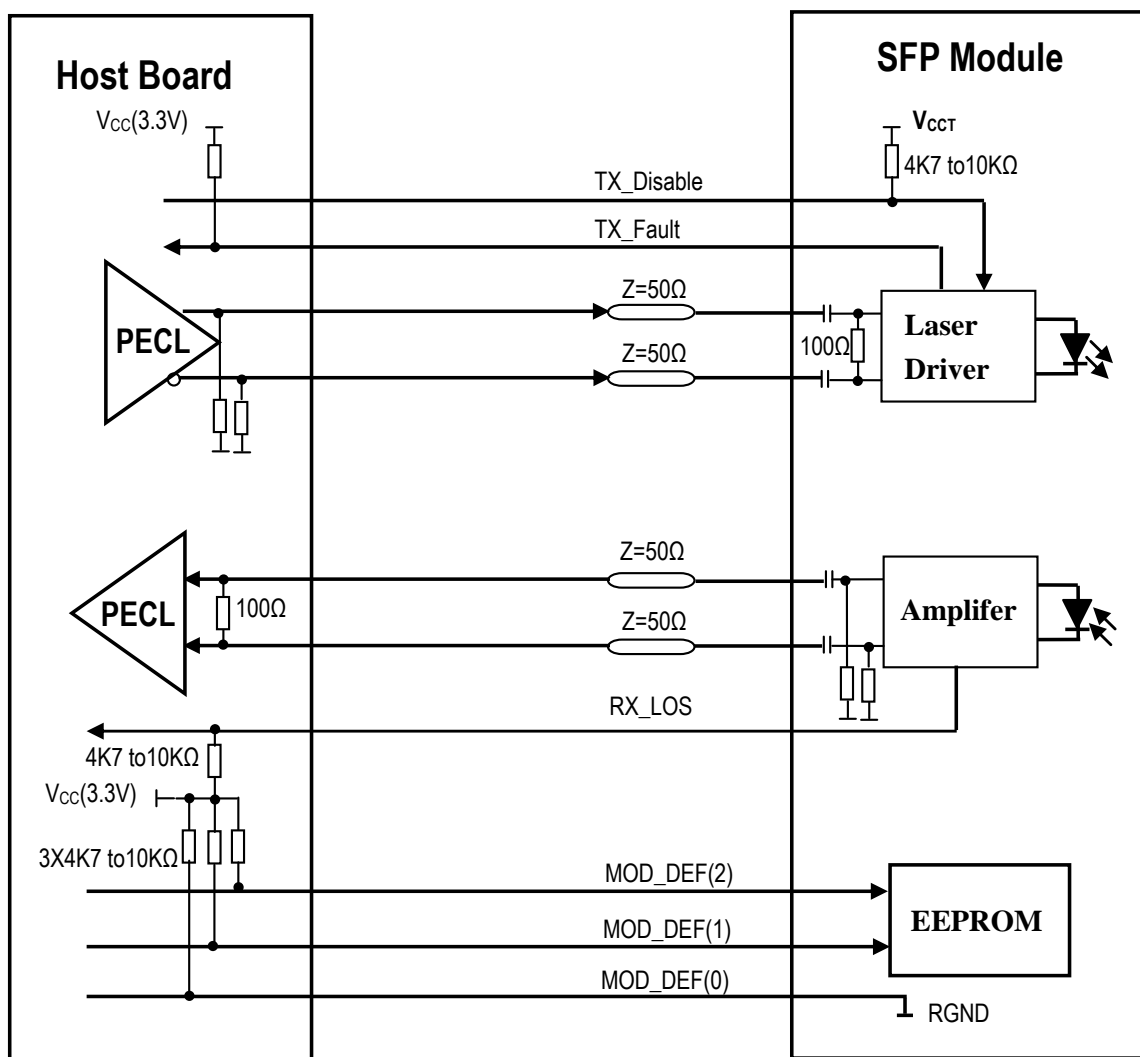


Figure 5. SFP Host Recommended Circuit

● Содержание памяти (EEPROM)

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
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	Gigabit Ethernet 1000Base-LX
11	1	Encoding	4B5B (02h)
12	1	BR,Nominal	Nominal baud rate
13	1	Reserved	(0000h)
14	1	Length(9um,km)	Link length supported for 9/125um fiber, units of km
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-61	2	Wavelength	Laser wavelength
62	1	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)

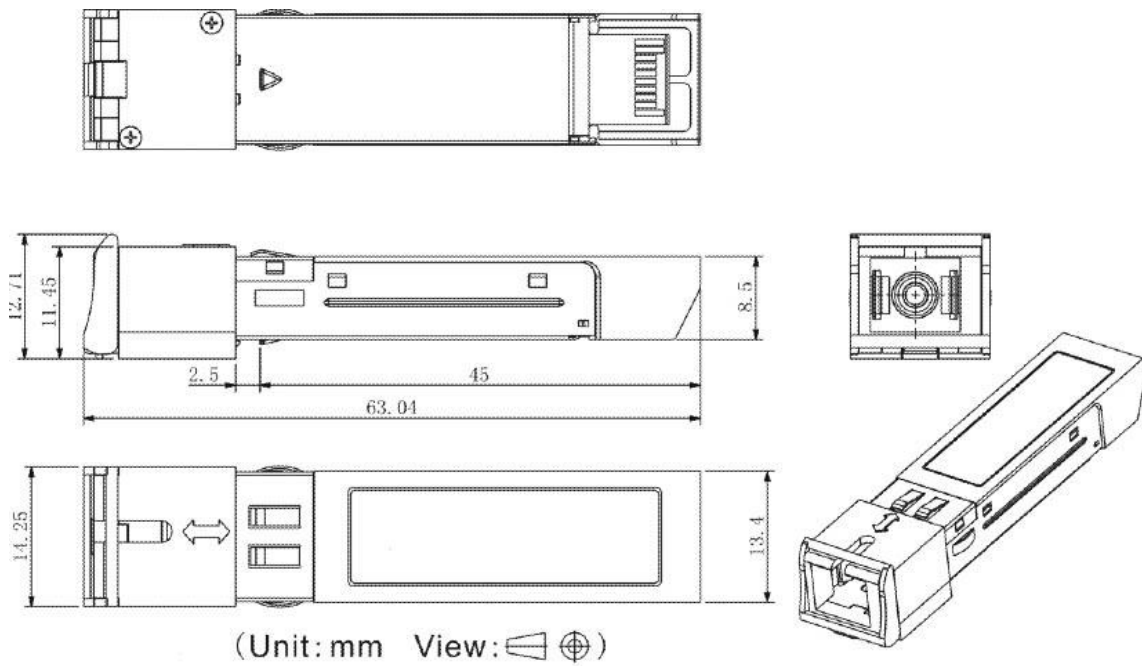
84-91	8	Date code	Manufacturing date code
92	1	Diagnostic Type	Diagnostics
93	1	Enhanced Options	Diagnostics
94	1	SFF-8472	Diagnostics
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
<b>Vendor Specific ID Fields</b>			
96-127	32	Readable	Vendor specific date, read only

● **Содержание памяти (A2h)**

<b>Data Address</b>	<b>Length (Byte)</b>	<b>Name of Length</b>	<b>Description and Contents</b>
<b>Diagnostic and control/status fields</b>			
0-39	40	A/W Thresholds	Diagnostic Flag Alarm and Warning Thresholds
40-55	16	Unallocated	
56-91	16	Ext Cal Constants	Diagnostic calibration constants for optional External Calibration
92-94	3	Unallocated	
95	1	CC_DMI	Check code for Base Diagnostic Fields (addresses 0 to 94)
96-105	10	Diagnostics	Diagnostic Monitor Data (internally or externally calibrated)
106-109	4	Unallocated	
110	1	Status/Control	Optional Status and Control Bits
111	1	Reserved	Reserved for SFF-8079
112-113	2	Alarm Flags	Diagnostic Alarm Flag Status Bits
114-115	2	Unallocated	
116-117	2	Warning Flags	Diagnostic Warning Flag Status Bits
118-119	2	Ext Status/Control	Extended module control and status bytes
<b>General use fields</b>			
120-127	8	Vendor Specific	Vendor specific memory addresses

128-247	120	User EEPROM	User writable non-volatile memory
248-255	8	Vendor Control	Vendor specific control addresses

● **Размеры**



**Figure 6. Mechanical Drawing**