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KAB-SFP+12/13-20 and KAB-SFP+13/12-20

10Gbps SFP+ Bi-Directional Transceiver, 20km Reach

1270/1330nm TX / 1330/1270 nm RX

Features

- ◆ Supports 9.95Gb/s to 10.3Gb/s data rates
- ◆ Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- ◆ Single 3.3V Supply
- ◆ Up to 20km on 9/125um SMF
- ◆ Power consumption less than 1.0 W
- ◆ A:1270nm DFB Laser transmitter,1330nm receiver
- ◆ B:1330nm DFB Laser transmitter,1270nm receiver
- ◆ Compliant with IEEE 802.3ae 10GBASE-LR and 10GBASE-LW
- ◆ SFP+ MSA SFF-8431 Compliant
- ◆ Digital Diagnostic SFF-8472 Compliant
- ◆ RoHS compliant and Lead Free
- ◆ Operating case temperature: Standard: -5 ~ 70 °C



Applications

- ◆ 10GBASE-LR at 10.3125Gbps
- ◆ 10GBASE-LW at 9.953Gbps
- ◆ Other Optical Links

Product description

The KAB-SFP+12/13-20 and KAB-SFP+13/12-20 series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-LR/LW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability.

The KAB-SFP+12/13-20 AND KAB-SFP+13/12-20 module is designed for single mode fiber and operates at a nominal wavelength of 1270nm or 1330nm; The transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Ordering information

Part Number	Product Description
KAB-SFP+12/13-20	1270nm/1330nm, 10Gbps, 20km, -5°C ~ +70°C
KAB-SFP+13/12-20	1330nm/1270nm, 10Gbps, 20km, -5°C ~ +70°C

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Block Diagram

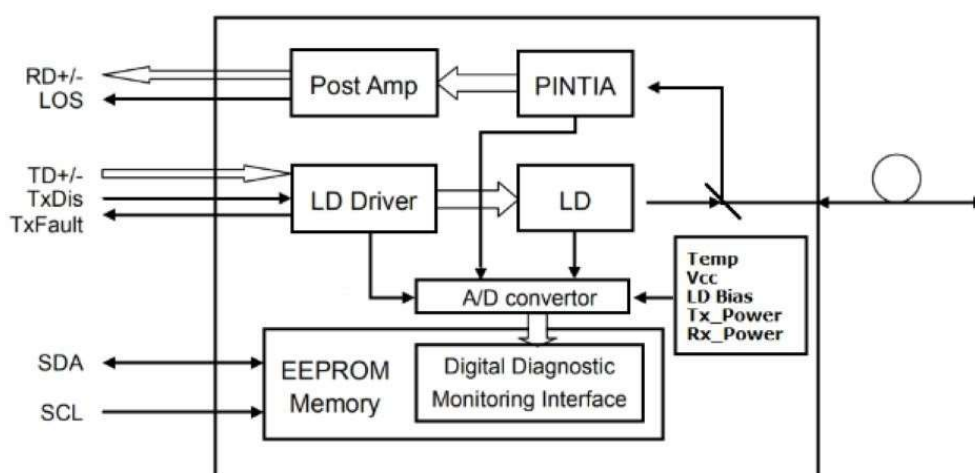


Figure1. Module Block Diagram

Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameters	Symbol	Min.	Max.	Unit
Supply Voltage	V _{cc}	-0.5	+4.0	V
Storage Temperature	T _c	-40	+85	°C
Operating Case Temperature	T _c	-5	+70	°C
Relative Humidity	RH	0	85	%

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max	Unit
Supply Voltage	V _{cc}	3.0	3.3	3.6	V
Supply Current	I _{cc}	-	-	300	mA
Operating Case Temperature	T _c	-5	25	70	°C
Module Power Dissipation	P _m	-	-	1.0	W

Notes:

[1] Measured with ITU-T G.652 SMF

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Electrical characteristics ($T_{OP} = -5$ to $70^{\circ}C$, $V_{CC} = 3.0$ to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Differential Data Input Amplitude	$V_{IN,P-P}$	180	-	850	mVpp	1
Input Differential Impedance	Z_{IN}	80	100	120	Ω	
Transmitter Fault Output-High	V_{OH}	2.4	-	V_{CC}	V	
Transmitter Fault Output-Low	V_{OL}	-0.3	-	0.4	V	
Transmitter Disable Voltage- High	V_{IH}	2.0	-	V_{CC}	V	
Transmitter Disable Voltage- low	V_{IL}	0	-	0.8	V	
Receiver						
Differential output voltage swing	$V_{OUT,P-P}$	300	-	850	mVpp	1
Output Differential Impedance	Z_{OUT}	80	100	120	Ω	
Data Output Rise/Fall time 20%~80%	T_r/T_f	-	-	28	ps	2
Deterministic Jitter	DJ	-	-	0.42	UI	
Total Jitter	TJ	-	-	0.70	UI	
LOS Output Voltage-High	V_{LOSH}	2.0	-	V_{CC}	V	3
LOS Output Voltage-Low	V_{LOSL}	-	-	0.8	V	3

Notes:

1. CML input/output, internally AC-coupled and terminated.
2. Measured with Module Compliance Test Board and OMA test pattern.
3. LOS is an open collector output. Should be pulled up with 4.7k Ω to 10k Ω on the host board.
Normal operation is logic 0; loss of signal is logic 1.

Optical characteristics ($T_{OP} = -5$ to $70^{\circ}C$, $V_{CC} = 3.0$ to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength(LR2733)	λ_c	1260	1270	1280	nm	
Optical Center Wavelength(LR3327)	λ_c	1320	1330	1340	nm	
Data Rate	BR	9.9528	10.3125	11.3168	Gbps	

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RMS Spectral Width (-	$\Delta\lambda$	-	-	1	nm	
Data Dependent	DDJ	-	-	0.10	UI	
Total	TJ	-	-	0.28	UI	
Side Mode Suppress	SMS	30			dB	
Average Output	Pop	-4		3	dBm	1
Extinction	ER	3.5	6	-	dB	2
Eye		Compliant with IEEE 802.3ae-2005 and ITU-T				
Transmitter and Dispersion	TDP			3.2	dB	
Average Power of OFF	POF			-30	dBm	
Receive						
Center Wavelength	λ_c		-	1340	nm	
Center Wavelength	λ_c	1260	-	1280	nm	
Average Receiver	RSNS			-14.4	dBm	3
Maximum Input	P _{MAX}	0.5	-	-	dB	3
Receiver	R _R	-	-	-12	dB	
LOS De-	LOSD			-15	dBm	
LOS	LOSA	-28			dBm	
LOS	LOSH	0.5		5	dB	

Notes:

1. The optical power is launched into SMF.
2. Measured with worst ER=3.5dB, RPBS 2³¹-1 test pattern @10.3125Gbs.
3. Measured with worst ER=3.5dB, RPBS 2³¹-1 test pattern @10.3125Gbs BER=<10⁻¹².

Timing and Electrical

Paramete	Symbo	Min.	Typica	Max	Unit
Tx Disable Negate	t _{on}	-	-	1	ms
Tx Disable Assert	t _{off}	-	-	10	μs
Time to Initialize, including Reset of Tx	t _{init}	-	-	300	ms
Tx Fault Assert	t _{fault}	-	-	100	μs
Tx Fault to	t _{reset}	10	-		μs
LOS Assert	t _{loss_on}	-	-	100	μs

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LOS De-assert Time	t_loss_off	-	-	100	µs
Serial ID Clock Rate	f_serial_clock	-	-	400	KHz
SDA, SCL, MOD_ABS High Level	V _H	2	-	V _{cc}	V
SDA, SCL, MOD_ABS Low Level	V _L	-	-	0.8	V

Pin Descriptions

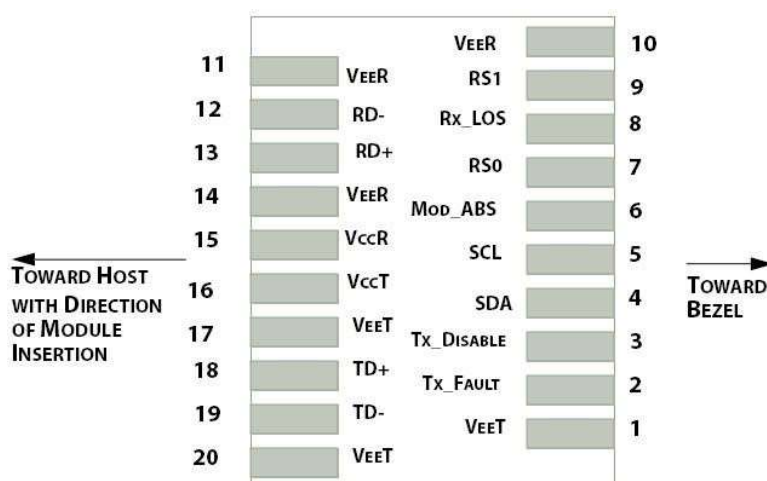


Figure2. Electrical Pin-out Details

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	RS0 for Rate Select: Open or Low = Module supports ≤4.25Gbps High = Module supports 9.95 Gb/s to 10.3125 Gb/s
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation

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9	RS1 [5]	No connection required
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

Notes:

- [1] Module circuit ground is isolated from module chassis ground within the module.
 [2].should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
 [3]Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.
 [4]Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted "High" when the SFP+ module is physically absent from a host slot.
 [5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

Digital Diagnostic Monitor Characteristics

Parameter	Calibration	Range	Accuracy	Unit
Transceiver Internal Temperature	Internal	-5 to +70°C	±3.0	°C
VCC3 Internal Supply Voltage	Internal	3.0 to 3.6V	±3.0	%
Laser Bias Current	Internal	0 to 90mA	±10	%
Tx Output Power	Internal	-5 to +3dBm	±3.0	dBm
Rx Input Power	Internal	-15.5 to +0.5dBm	±3.0	dBm

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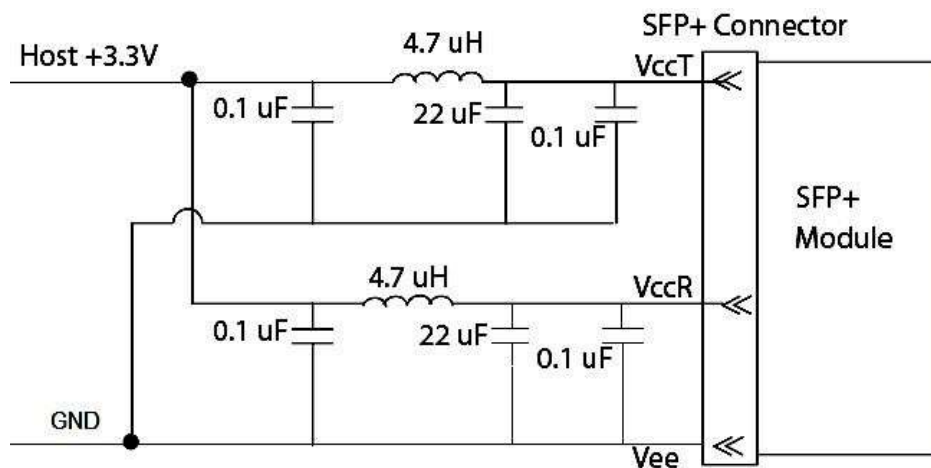


Figure3. Host Board Power Supply Filters Circuit

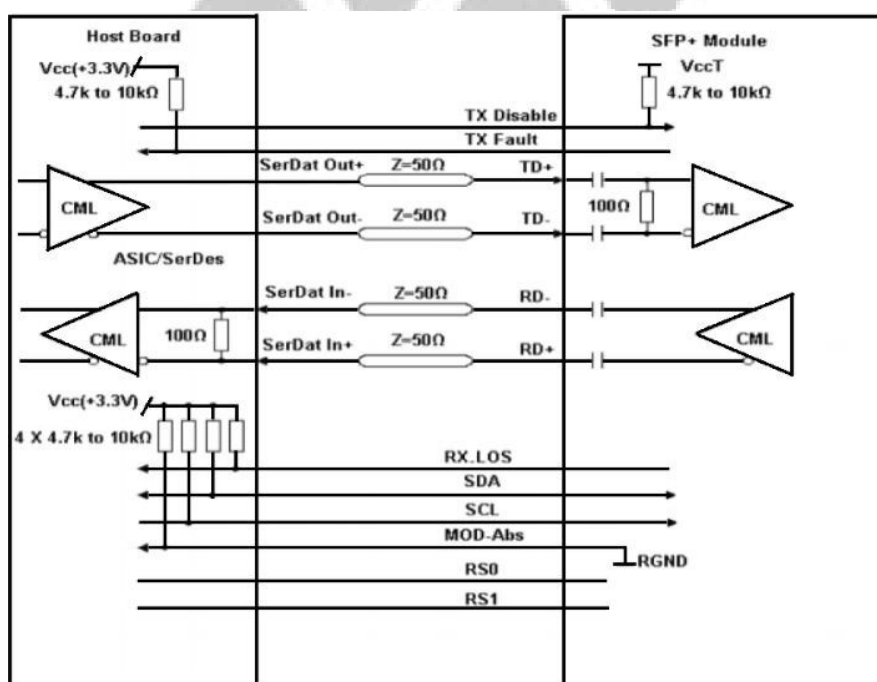


Figure4. Host-Module Interface

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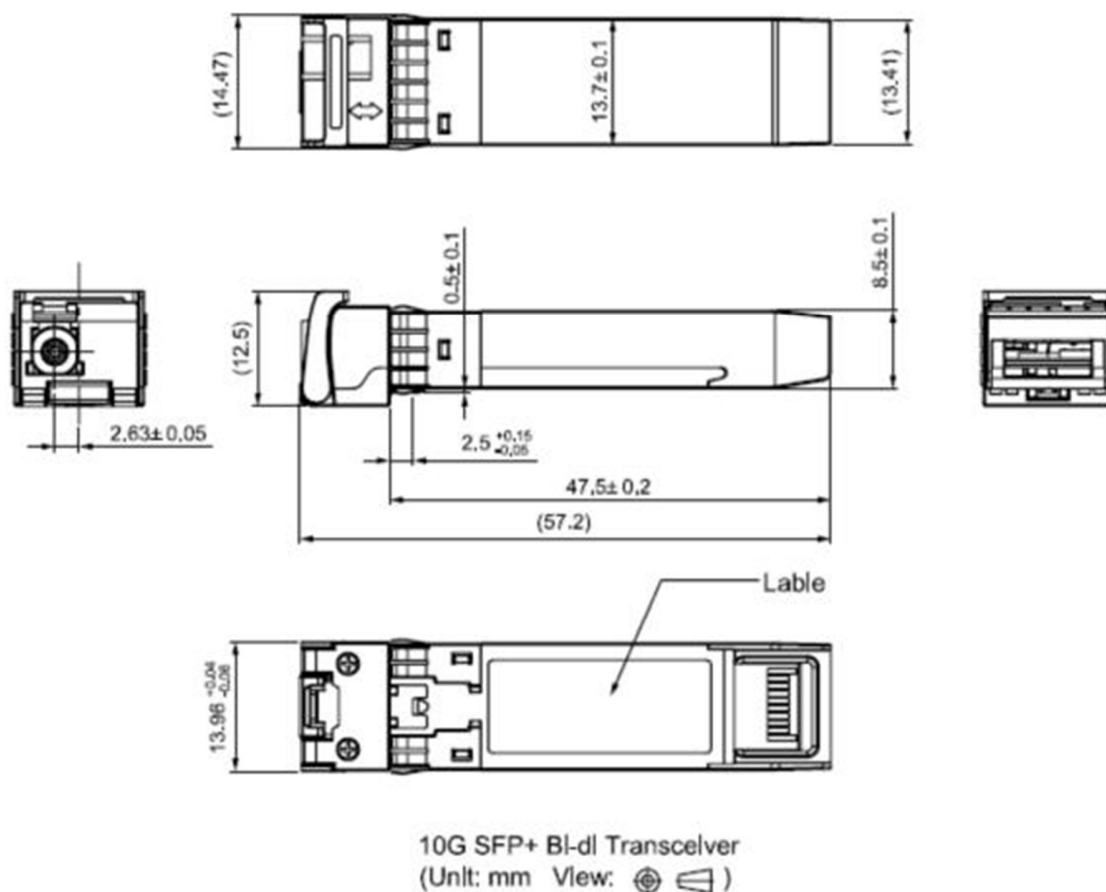


Figure5. Mechanical Dimensions

Important Notice

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