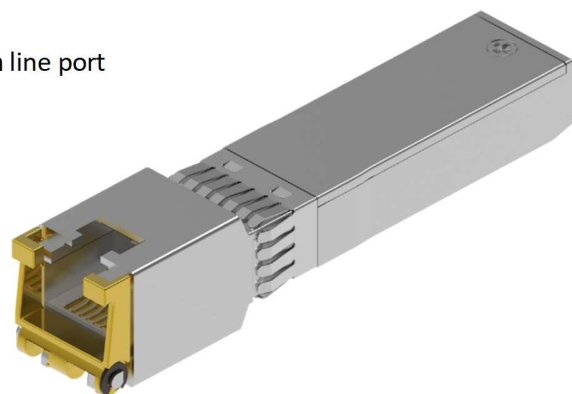


10G-BASE-T Copper SFP+ Transceiver

KAB-SFP+T-10G

Features

- ✓ Support 10Gbase-T / 5Gbase-T / 2.5Gbase-T / 1000base-T on line port
- ✓ Support 10Gbase-R on host port
- ✓ Hot-pluggable SFP footprint
- ✓ Compact RJ-45 connector assembly
- ✓ RoHS compliant and lead-free
- ✓ Single +3.3V power supply
- ✓ 10 Gigabit Ethernet over Cat 6a cable
- ✓ Operating case temperature range of 0°C to +70°C



Applications

- ✓ 10 Gigabit Ethernet over Cat 6A/7 cable
- ✓ 5 Gigabit Ethernet over Cat 6A/7 cable
- ✓ 2.5 Gigabit Ethernet over Cat 6A/7 cable
- ✓ 1.25 Gigabit Ethernet over Cat 5e cable

Description

KAB's KAB-SFP+T-10G Copper Small Form Pluggable Plus (SFP+) transceivers is high-performance, cost-effective module compliant with the 10 Gigabit Ethernet and 10G BASE-T standards as specified in IEEE 802.3-2015 and IEEE 802.3an, which supporting 10Gbps data-rate up to 30 meters reach over shielded twisted-pair category 6A cable. The module supports 10Gbps full duplex data-links with 16-level Pulse Amplitude Modulation (PAM) signals. The module provides standard serial ID information compliant with SFP+ MSA, which can be accessed with address of A0h via the 2wire serial bus. The physical IC can also be accessed via 2wire serial bus at address ACh.

Ordering Information

Part number	Speed mode	MAC interface	TX Disable function	Link Indicator on RX_LOS Pin	Case Temp
KAB-SFP+T-10G	10Gbps	XFI/5GBASE-R/2500BASE-X/SGMII	YES	YES	0~70°C

KAB-SFP+T-10G

Pin Definitions

Pin Diagram

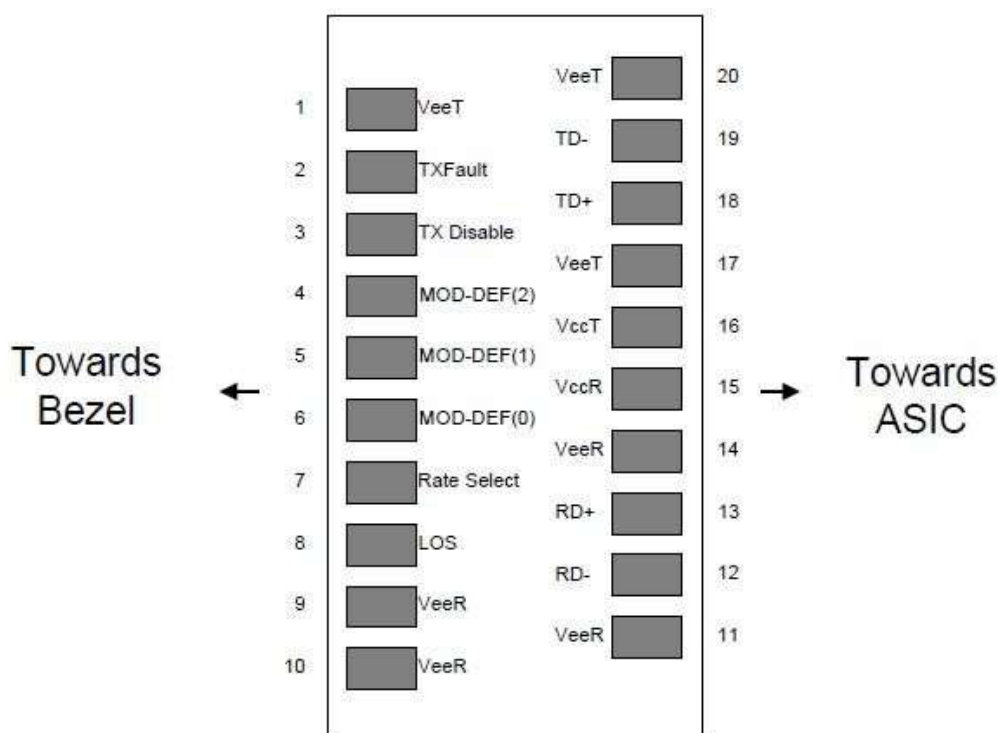


Figure 1. Pin Definitions

Pin Descriptions

Pin	Signal Name	Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault. Not supported.	
3	TDIS	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	
8	LOS	High indicates no linked. low indicates linked.	

Pin	Signal Name	Description	Notes
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	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	VEET	Transmitter Ground (Common with Receiver Ground)	1

Note:

1. Circuit ground is connected to chassis ground
2. PHY disabled on TDIS > 2.0V or open, enabled on TDIS < 0.8V
3. Should be pulled up with 4.7k - 10k Ohms on host board to a voltage between 2.0 V and 3.6 V.

+3.3V Volt Electrical Power Interface

+3.3V volt Electrical Power Interface						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
Supply Current	Is		900	1100	mA	3.6W max power over full range of voltage and temperature. See caution note below
Input Voltage	Vcc	3.13	3.3	3.47	V	Referenced to GND
Maximum Voltage	Vmax			4	V	

Low-speed signals, electronic characteristics

Low-Speed Signals, Electronic Characteristics					
Parameter	Symbol	Min	Max	Units	Notes/Conditions
SFP+ Output LOW	VOL	0	0.5	V	4.7k to 10k pull-up to host Vcc, measured at host side of connector
SFP+ Output HIGH	VOH	host_Vcc - 0.5	host_Vcc + 0.3	V	4.7k to 10k pull-up to host Vcc, measured at host side of connector

Low-Speed Signals, Electronic Characteristics					
Parameter	Symbol	Min	Max	Units	Notes/Conditions
SFP+ Input LOW	VIL	0	0.8	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
SFP+ Input HIGH	VIH	2	Vcc + 0.3	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector

High-speed electrical interface, transmission line-SFP+

High-Speed Electrical Interface Transmission Line-SFP+						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Zout,TX		100		Ohm	Differential, for all Frequencies between 1MHz and 800MHz
Rx Input Impedance	Zin,RX		100		Ohm	Differential, for all Frequencies between 1MHz and 800MHz

High-speed electrical interface, host-SFP+

High-Speed Electrical Interface, Host-SFP						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Single ended data input swing	Vinsing	250		1200	mV	Single ended
Single ended data output swing	Voutsing	350		800	mV	Single ended
Rise/Fall Time	Tr,Tf		175		psec	20%-80%
Tx Input Impedance	Zin		50		Ohm	Single ended
Rx Output Impedance	Zout		50		Ohm	Single ended

General specifications

General						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Data Rate	BR	1		10	Gbps	IEEE 802.3 compatible. See Notes 1,2 below
Cable Length	L			30	m	Category 6A STP. BER <10-12

Notes:

1. Clock tolerance is +/- 50 ppm



Environmental specifications

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Storage Temperature		-40		+85	°C

EEPROM Information (A0)

Addr	Field Size (Bytes)	Name of Field	HEX	Description
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	MOD4
3-10	8	Transceiver	00 00 00 00 00 00 00 00	Transmitter Code
11	1	Encoding	06	64B66B
12	1	BR, nominal	67	10000M bps
13	1	Reserved	00	
14	1	Length (9um)-km	00	
15	1	Length (9um)	00	
16	1	Length (50um)	08	80
17	1	Length (62.5um)	03	30
18	1	Length (copper)	00	
19	1	Reserved	1E	30
20-35	16	Vendor name	47 69 67 61 6C 69 67 68 74 20 20 20 20 20 20 20	KAB
36	1	Reserved	00	
37-39	3	Vendor OUI	00 00 00	
40-55	16	Vendor PN	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX	ASC II
56-59	4	Vendor rev	31 2E 30 20	V1.0
60-61	2	Wavelength	00 00	850nm
62	1	Reserved	00	
63	1	CC BASE	XX	Check sum of byte 0~62
64-65	2	Options	00 1A	LOS, TX_DISABLE, TX_FAULT
66	1	BR, max	00	
67	1	BR, min	00	
68-83	16	Vendor SN	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Unspecified

Addr	Field Size (Bytes)	Name of Field	HEX	Description
84-91	8	Vendor date code	XX XX XX 20	Year, Month, Day
92-94	3	Reserved	XX XX XX	
95	1	CC_EXT	XX	Check sum of byte 64~94
96-255	160	Vendor specific		

Serial Communication Protocol

All KAB SFPs support the 2-wire serial communication protocol outlined in the SFP MSA. These SFPs use an MCU, can be accessed with address of A0h.

Serial Bus Timing, Requirements						
Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
I ² C Clock Rate		0		200,000	Hz	

Recommended Application Circuit

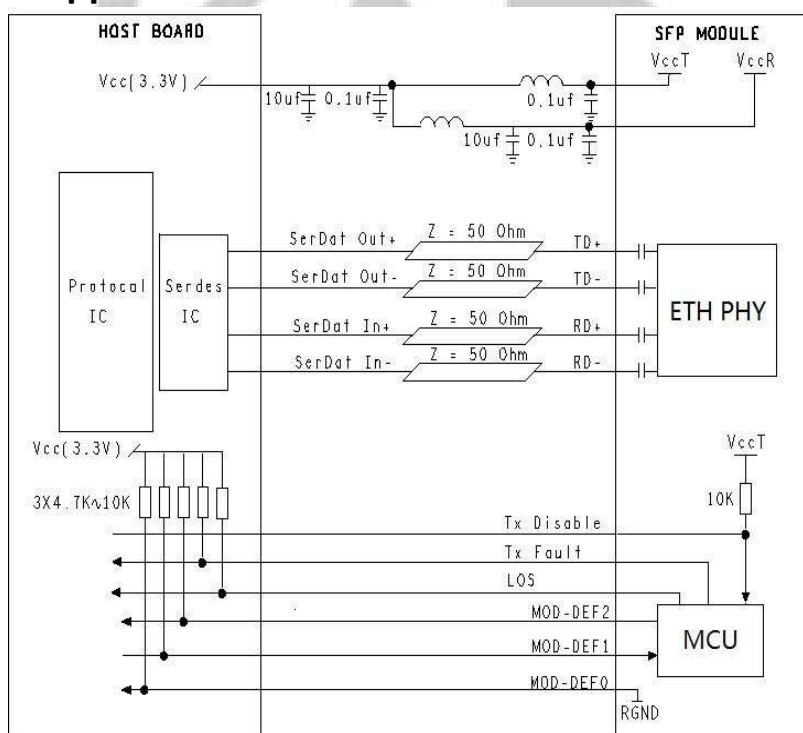


Figure 4. Recommended Host Board Power Supply Circuit

Mechanical Specifications

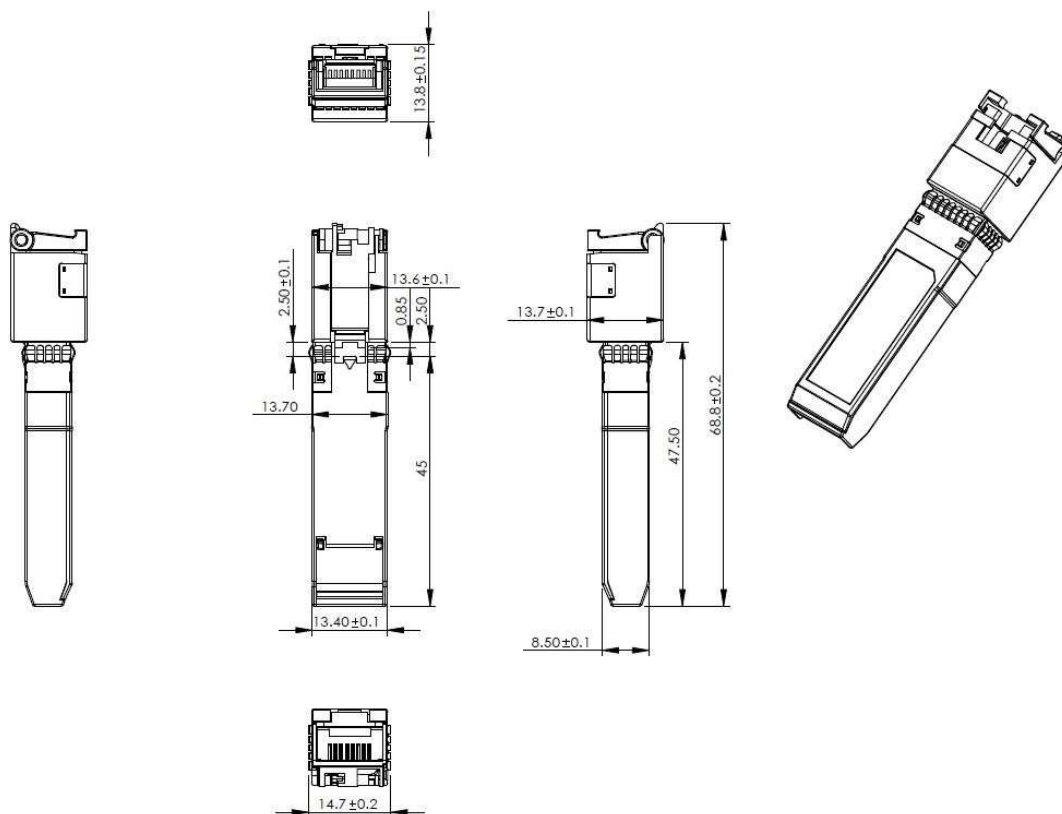


Figure 6. Mechanical dimensions

Regulatory Compliance

Feature	Standard
Environmental protection	2011/65/EU
CE EMC	EN55032 EN55035
FCC	47CFR FCC Part 15 Subpart B (Class B) ANSI C63.4:2014
RoHS	2011/65/EU

References

1. SFF-8431 Specifications for Enhanced Small Form Factor Pluggable Module SFP+ Revision 4.1 6th of July 2009.
2. IEEE802.3-2015.



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KAB-SFP+T-10G