


## 32GFC 850nm SFP28 100m w/o FEC Optical Transceiver

**P/N: KAB-SFP28-SR-32G**

### Features

- ✓ Hot-pluggable SFP28 form factor
- ✓ Supports 28.05Gbps data rate
- ✓ Maximum link length of 70m on OM3 MMF and 100m

### MMF with FEC

- ✓ 850nm VCSEL laser and PIN photo-detector
- ✓ Internal CDR on both Transmitter and Receiver channels
- ✓ Duplex LC receptacle
- ✓ Single 3.3V power supply
- ✓ Power dissipation < 1W
- ✓ Digital diagnostics functions are available via the I<sup>2</sup>C interface
- ✓ RoHS 2.0 compliant 
- ✓ Commercial case temperature range: 0°C to 70°C



### Applications

- ✓ 32G Fiber Channel/OTU4

### Description

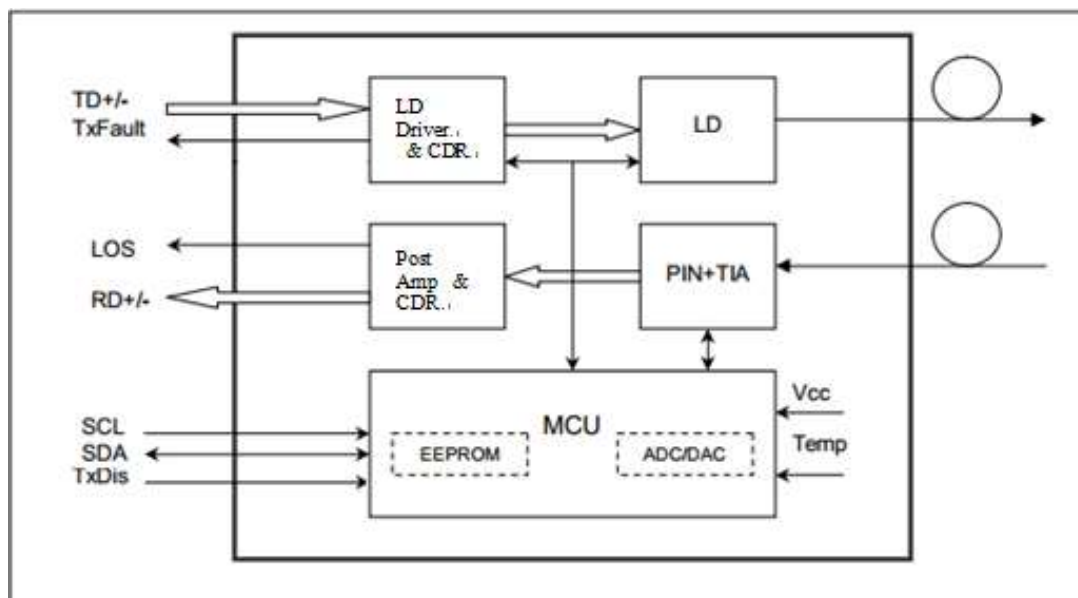
KAB-SFP28-SR-32G is a single-Channel, Pluggable, Fiber-Optic SFP28 for 28.05Gbps Fiber Channel/OTU4 SFP28 SR Applications. It is a high performance module for short-range data communication and interconnect applications which operate at 28.05Gbps(32GFC) up to 70 m using OM3 fiber and 100m using without KR-FEC, and 300m using with FEC. This module is designed to operate over multimode fiber systems using a nominal wavelength of 850nm. The electrical interface uses a 20contact edge type connector. The optical interface uses duplex LC receptacle. This module incorporates a proven circuit and VCSEL technology to provide reliable long life, high performance, and consistent service.

### Ordering Information

Part Number	Product Description
KAB-SFP28-SR-32G	32GFC SFP28 SR, 28.05Gb/s, 850nm, 100m, OM4 MMF without FEC, 0°C to 70°C

**KAB-SFP28-SR-32G**

### Block Diagram



### Absolute Maximum Ratings

Table1 - Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	0	3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

### Recommended Operating Conditions

Table2 - Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		70	°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc			300	mA
Fiber Length on 50/125µm high-bandwidth (OM4) MMF				100	m

## Optical and Electrical Characteristics

**Table 3 - Optical and Electrical Characteristics**

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Data rate	BR		28.05		Gbps	
Centre Wavelength	$\lambda_c$	840	850	860	nm	
Spectral Width (-20dB)	$\sigma$			0.6	nm	
Average Output Power	$P_{avg}$	-8.4		2.4	dBm	
Optical Power OMA	$P_{OMA}$	-6.4		3	dBm	
Extinction Ratio	ER	2			dB	
Differential data input swing	$V_{IN,PP}$	40		1000	mV	
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$	
TX Disable	Disable		2.0	Vcc	V	
	Enable		0	0.8	V	
TX Fault	Fault		2.0	Vcc	V	
	Normal		0	0.8	V	
<b>Receiver</b>						
Data rate	BR		28.05		Gbps	
Centre Wavelength	$\lambda_c$	840	850	860	nm	
Receiver sensitivity in OMA (32GFC,28.05Gbps)				-5.2	dBm	1
Receiver sensitivity in OMA (OTU4,27.95Gbps)				-5.2	dBm	2
Receiver Power (OMA)				3	dBm	
LOS De-Assert	$LOS_D$			-13	dBm	
LOS Assert	$LOS_A$	-30			dBm	
LOS Hysteresis		0.5			dB	
Differential data output swing	$V_{out, PP}$	300		850	mV	
LOS	High	2.0		Vcc	V	
	Low			0.8	V	

**Notes:**

1. Measured with conformance test signal at TP3 for BER=1E-12@32GFC,28.05Gbps.
2. Measured with conformance test signal at TP3 for BER=1E-12@OTU4,27.95Gbps.



## Timing and Electrical

**Table 4 - Timing and Electrical**

<i>Parameter</i>	<i>Symbol</i>	<i>Min.</i>	<i>Max.</i>	<i>Unit</i>	<i>Conditions</i>
Tx_Disable assert time	t_off		100	μs	Rising edge of Tx_Disable to fall of output signal below 10% of nominal
Tx_Disable negate time	t_on		2	ms	Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start up or fault recovery.
Time to initialize 2-wire interface	t_2w_start_up		300	ms	From power on or hot plug after the supply meeting <a href="#">Table 8</a> .
Time to initialize	t_start_up		300	ms	From power supplies meeting <a href="#">Table 8</a> or hot plug or Tx disable negated during power up, or Tx_Fault recovery, until non-cooled power level I part (or non-cooled power level II part already enabled at power level II for Tx_Fault recovery) is fully operational.
Time to initialize cooled module and time to power up a cooled module to Power Level II	t_start_up_cooled		90	s	From power supplies meeting <a href="#">Table 8</a> or hot plug, or Tx disable negated during power up or Tx_Fault recovery, until cooled power level I part (or cooled power level II part during fault recovery) is fully operational. Also, from stop bit low-to-high SDA transition enabling Power Level II until cooled module is fully operational
Time to Power Up to Level II	t_power_level2		300	ms	From stop bit low-to-high SDA transition enabling power level II until non-cooled module is fully operational
Time to Power Down from Level II	t_power_down		300	ms	From stop bit low-to-high SDA transition disabling power level II until module is within power level I requirements
Tx_Fault assert	Tx_Fault_on		1	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault assert for cooled module	Tx_Fault_on_cooled		50	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault Reset	t_reset	10		μs	Time Tx_Disable must be held high to reset Tx_Fault
RS0, RS1 rate select timing for FC	t_RS0_FC, t_RS1_FC		500	μs	From assertion till stable output
RS0, RS1 rate select timing non FC	t_RS0, t_RS1		24	ms	From assertion till stable output
Rx_LOS assert delay	t_los_on		100	μs	From occurrence of loss of signal to assertion of Rx_LOS
Rx_LOS negate delay	t_los_off		100	μs	From occurrence of presence of signal to negation of Rx_LOS



## Diagnostics

**Table5 – DiagnosticsSpecification**

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 20	mA	±10%	Internal / External
TX Power	-8 to 3	dBm	±3dB	Internal / External
RX Power	-14 to 0	dBm	±3dB	Internal / External

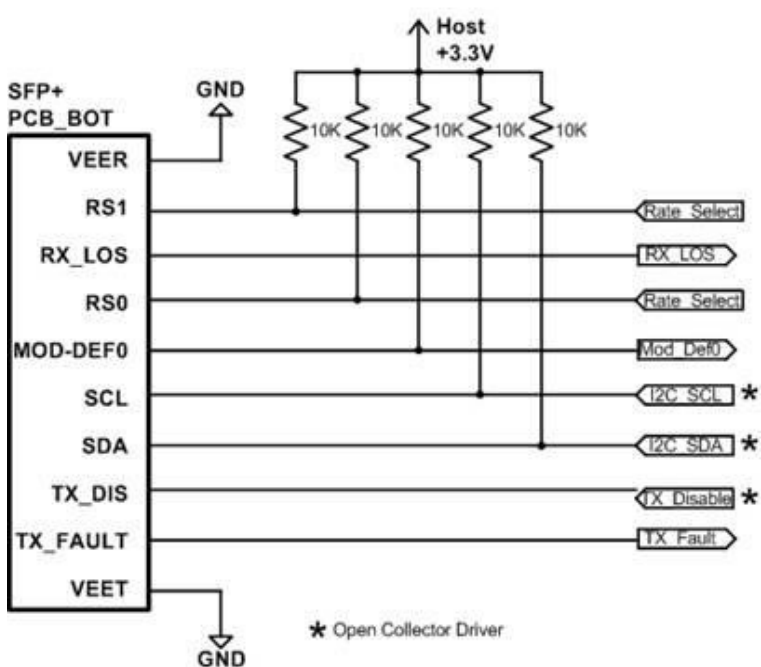
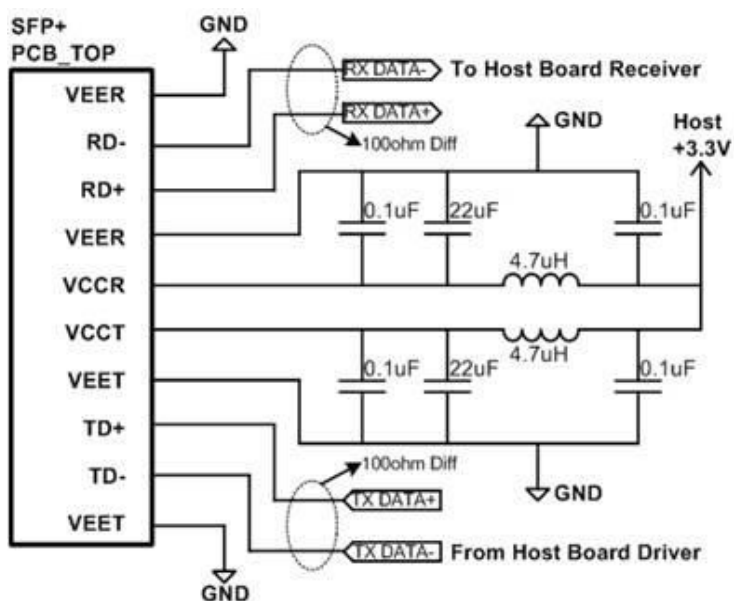
## Digital Diagnostic Memory Map

PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_ABS	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTL-I	RS1	Transmitter Rate Select (not used)	
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

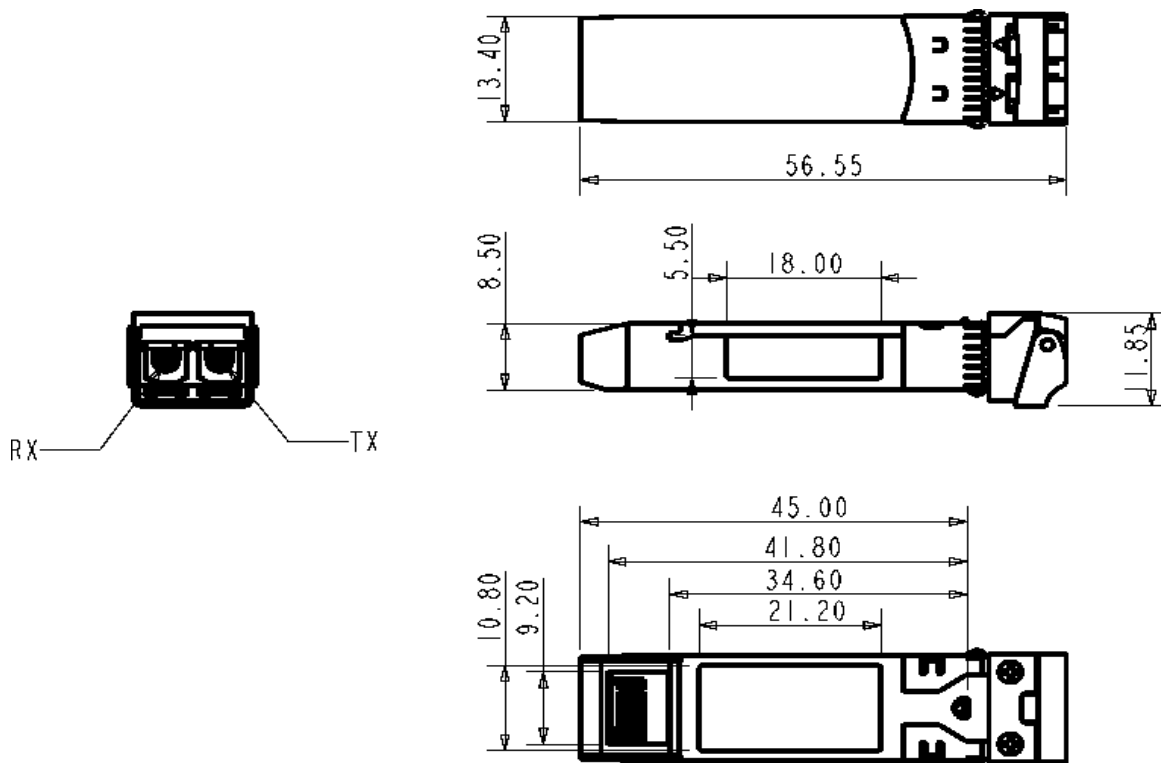
**Notes:**

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board

**Recommended Interface Circuit**



### Mechanical Dimensions



### Regulatory Compliance

KAB KAB-SFP28-SR-32G transceivers are Class 1 Laser Products. They are certified per the following standards:

Feature	Agency	Standard
Laser Eye Safety	FDA/CDRH	CDRH 21 CFR 1040 and Laser Notice 50
Laser Eye Safety	TÜV	IEC 60825-1:2014 EN 60825-1:2014 EN 60825-2:2004+A1+A2
Electrical Safety	TÜV	EN 60950-1:2006+A11+A1+A12+A2
Electrical Safety	UL/CSA	UL 60950-1 & CAN/CSA C22.2 No.60950-1
EMC	FCC	47 CFR FCC Part 15 Subpart B
EMC	CE-EMC	EN 55032:2015 EN 55024:2010+A1:2015 EN 61000-3-2:2014 EN 61000-3-3:2013

Comply with the following directives:

Low Voltage Directive (LVD) 2014/35/EU,

Electromagnetic Compatibility Directive (EMC) 2014/30/EU,

Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU with amendment 2015/863, Chemical substances (REACH) Regulation (EC)No 1907/2006

#### References

1. SFP MSA
2. 25GBASE-SR
3. Directive 2011/65/EU of the European Parliament and of the Council, "on the restriction of the use of certain hazardous substances in electrical and electronic equipment," July 1, 2011.



#### CAUTION:

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

#### Important Notice

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