

# Technical Datasheet

## BN-CKM-S-ZX-C

### IBM® Compatible 1000Base-ZX SFP Transceiver

Hot Pluggable, +3.3V, Duplex LC, 1550nm, 80km, Commercial Temperature

#### FEATURES

- Up to 1.25Gb/s Data Links
- Hot-Pluggable
- Duplex LC connector
- Up to 80km on 9/125µm SMF
- 1550nm DFB laser transmitter
- Single +3.3V Power Supply
- Low power dissipation <1W typically
- Commercial Operating Temperature Range: 0°C to 70°C
- RoHS compliant and Lead Free

#### APPLICATIONS

- Metro/Access Networks
- 1.25 Gb/s 1000Base-ZX Ethernet
- 1×Fibre Channel
- Other Optical Links

#### DESCRIPTION

ATGBICS® Compatible BN-CKM-S-ZX-C is a high performance, cost effective module which have a duplex LC optics interface. Standard AC coupled CML for high speed signal and LVTTTL control and monitor signals. The receiver section uses a PIN receiver and the transmitter uses a 1550 nm DFB laser, up to 22dB link budge ensure this module 1000Base Ethernet 80km application.

#### Absolute Maximum Ratings

| Parameter                    | Symbol         | Min. | Typical | Max. | Unit |
|------------------------------|----------------|------|---------|------|------|
| <b>Operating Temperature</b> | T <sub>o</sub> | 0    |         | 70   | °C   |
| <b>Storage Temperature</b>   | T <sub>s</sub> | -40  |         | 85   | °C   |
| <b>Supply Voltage</b>        | VCC            | -0.5 |         | 4    | V    |
| <b>Relative Humidity</b>     | RH             | 0    |         | 85   | %    |

#### Recommended Operating Environment

# Technical Datasheet

| Parameter                  | Symbol                       | Min.  | Typical | Max.                | Unit |
|----------------------------|------------------------------|-------|---------|---------------------|------|
| Case operating Temperature | Commercial<br>T <sub>c</sub> | 0     |         | 70                  | °C   |
| Supply Voltage             | V <sub>cc</sub>              | 3.135 |         | 3.465               | V    |
| Supply Current             | I <sub>cc</sub>              |       |         | 300                 | mA   |
| Inrush Current             | I <sub>surge</sub>           |       |         | I <sub>cc</sub> +30 | mA   |
| Maximum Power              | P <sub>max</sub>             |       |         | 1                   | W    |

## Electrical Characteristics (T<sub>o</sub> = 0 to 70°C, V<sub>CC</sub> = 3.135 to 3.465 Volts)

| Parameter                      | Symbol                | Min.                  | Typical | Max.                  | Unit  | Notes |
|--------------------------------|-----------------------|-----------------------|---------|-----------------------|-------|-------|
| <b>Transmitter Section:</b>    |                       |                       |         |                       |       |       |
| Input differential impedance   | R <sub>in</sub>       | 90                    | 100     | 110                   |       |       |
| Single ended data input swing  | V <sub>in</sub> PP    | 250                   |         | 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>dassert</sub>  |                       |         | 10                    | us    |       |
| <b>Receiver Section:</b>       |                       |                       |         |                       |       |       |
| Single ended data output swing | V <sub>out,pp</sub>   | 250                   |         | 800                   | mv    | 3     |
| 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     |

### Notes:

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 20Hz 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.
7. Optical Parameters (V<sub>OP</sub> = 0 to 70°C, V<sub>cc</sub> = 3.135 to 3.465V)

# Technical Datasheet

| Parameter  | Symbol  | Min. | Typical | Max.  | Unit  | Notes |
|--|---|------|---------|-------|-------|-------|
| <b>Transmitter Section:</b>                              |   |      |         |       |       |       |
| Center Wavelength  | $\lambda_c$                                       | 1530 | 1550    | 1570  | nm    |       |
| Spectral Width   | $\sigma$  |      |         | 1     | nm    |       |
| Side Mode Suppression Ratio                              | SMSR  | 30   |         |       | dB    |       |
| Optical Output Power                                     | P <sub>out</sub>                                  | -2   |         | +3    | dBm   | 1     |
| Extinction Ratio   | ER  | 9    |         |       | dB    |       |
| Optical Rise/Fall Time                                   | tr / tf   |      |         | 260   | ps    | 2     |
| Relative Intensity Noise                                 | RIN   |      |         | -120  | dB/Hz |       |
| Output Eye Mask  | Compliant with IEEE802.3 z (class 1 laser safety) |      |         |       |       |       |
| <b>Receiver Section:</b>                                 |   |      |         |       |       |       |
| Optical Input Wavelength                                 | $\lambda_c$                                       | 1270 |         | 1610  | nm    |       |
| Receiver Overload  | Pol   | -3   |         |       | dBm   | 4     |
| RX Sensitivity   | Sen   |      |         | -24   | dBm   | 4     |
| RX_LOS Assert  | LOS A   | -40  |         |       | dBm   |       |
| RX_LOS De-assert   | LOS D   |      |         | -25   | dBm   |       |
| RX_LOS Hysteresis  | LOS H   | 0.5  |         |       | dB    |       |
| <b>General Specifications:</b>                           |   |      |         |       |       |       |
| Data Rate  | BR  |      | 1.25    |       | Gb/s  |       |
| Bit Error Rate   | BER   |      |         | 10-12 |       |       |
| Max. Supported Link Length on 9/125 $\mu$ m SMF@1.25Gb/s | LMAX  |      | 80      |       | km    |       |
| Total System Budget                                      | LB  | 22   |         |       | dB    |       |

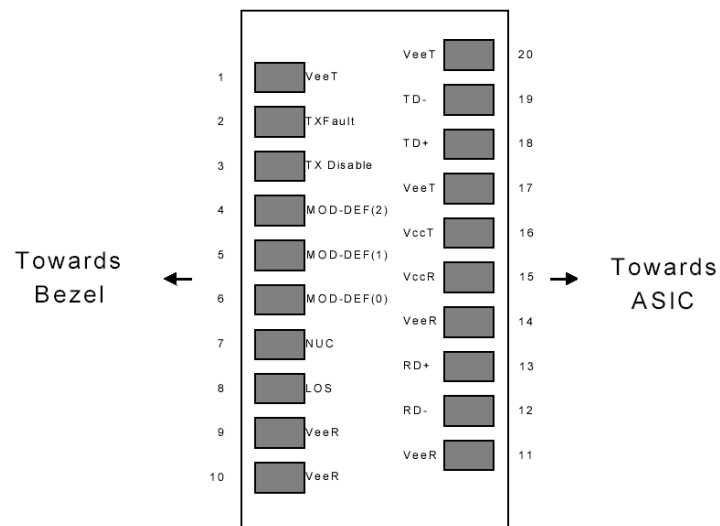
Notes:

1. The optical power is launched into SMF.
2. 20-80%.
3. Jitter measurements taken using Agilent OMNIBERT 718 in accordance with GR-253.
4. Measured with PRBS 27-1 at 10-12 BER

# Technical Datasheet

## Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



**Diagram of Host Board Connector Block Pin Numbers and Names**

# Technical Datasheet

## Pin Function Definitions

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

### 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

## SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules can be accessed through the I2C interface at address A0h.

# Technical Datasheet

## EEPROM Serial ID Memory Contents (A0h)

| Data Address                     | Length (Byte) | Name of Length | Description and Contents  |
|----------------------------------|---------------|----------------|---|
| <b>Base ID Fields</b>            |               |                |   |
| 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    |   |
| 11                               | 1             | Encoding       | NRZ(03h)  |
| 12                               | 1             | BR, Nominal    | Nominal baud rate, unit of 100Mbps  |
| 13-14                            | 2             | Reserved       | (0000h)   |
| 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: ATGBICS  |
| 36                               | 1             | Reserved       |   |
| 37-39                            | 3             | Vendor OUI     | SFP transceiver vendor OUI ID   |
| 40-55                            | 16            | Vendor PN      | Part Number: "BN-CKM-S-ZX-C" (ASCII)  |
| 56-59                            | 4             | Vendor rev     | Revision level for part number  |
| 60-62                            | 3             | 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      | 's Manufacturing date code  |
| 92-94                            | 3             | Reserved       |   |
| 95                               | 1             | CCEX           | Check code for the extended ID Fields (addresses 64 to 94)  |
| <b>Vendor Specific ID Fields</b> |               |                |   |
| 96-127                           | 32            | Readable       | specific date, read only  |
| 128-255                          | 128           | Reserved       | Reserved for SFF-8079   |

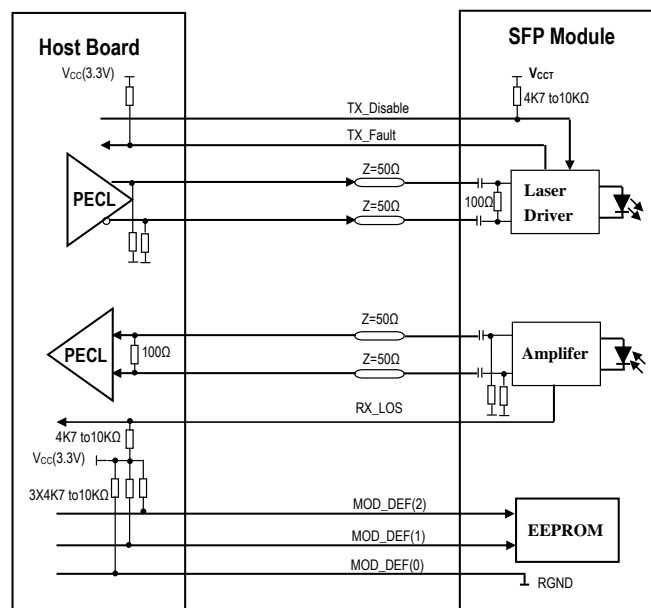
# Technical Datasheet

## Regulatory Compliance

The BN-CKM-S-ZX-C complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

|   |  |  |
|---|--|--|
| Electrostatic Discharge (ESD) to the Electrical Pins      | MIL-STD-883E<br>Method 3015.7                                      | Class 1(>1000 V)                       |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2<br>GR-1089-CORE                                      | Compatible with standards              |
| Electromagnetic Interference (EMI)                        | FCC Part 15 Class B<br>EN55022 Class B (CISPR 22B)<br>VCCI Class B | Compatible with standards              |
| Laser Eye Safety  | FDA 21CFR 1040.10 and 1040.11<br>EN60950, EN (IEC) 60825-1,2       | Compatible with Class 1 laser product. |

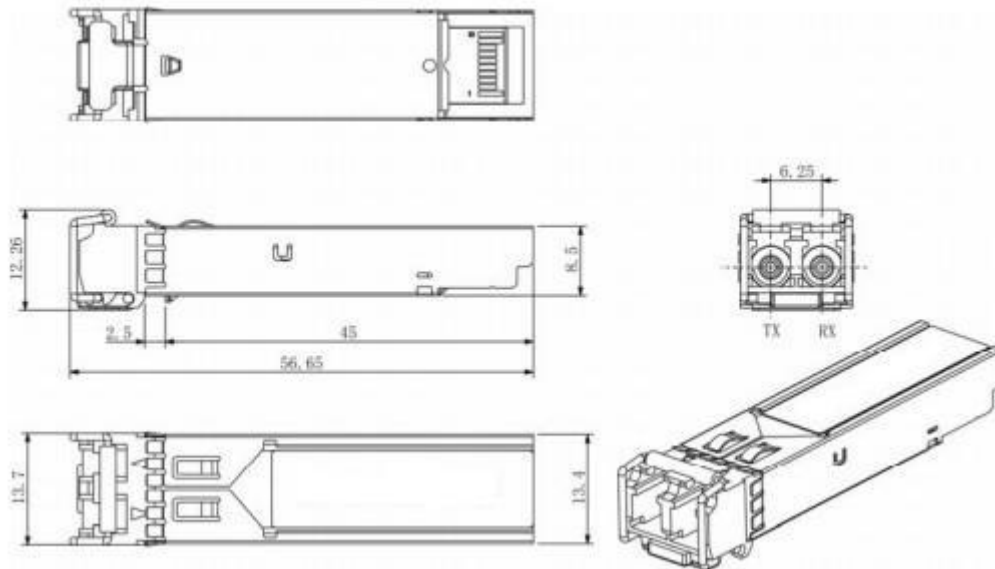
## Recommended Circuit



**SFP Host Recommended Circuit**

# Technical Datasheet

## Mechanical Dimensions (units: mm)



**Mechanical Drawing**