ATGBICS® by
APPROVED TECHNOLOGY

# Technical Datasheet

# AFCT-5765ATLZ-C

## Avago Broadcom® Compatible 100Base-LX SFP Transceiver

Hot Pluggable, +3.3V, Duplex LC, 1310nm, up to 15km, Industrial Temperature

### FEATURES

- Up to 100Mb/s Data Links
- Hot-Pluggable
- Duplex LC connector
- Up to 15km on 9/125μm SMF
- 1310nm FP laser transmitter
- Single +3.3V Power Supply
- Low power dissipation <1W typically
- Industrial Operating Temperature Range: -40 to 85°C
- RoHS compliant and Lead Free

### APPLICATIONS

- SONET OC-3/SDH STM-1
- Fast Ethernet
- Other Optical Links

### DESCRIPTION

ATGBICS® Compatible AFCT-5765ATLZ-C is a high-performance, cost-effective module which have a duplex LC optics interface. Standard AC coupled CML for high-speed signal and LVTTL control and monitor signals. The receiver section uses a PIN receiver, and the transmitter uses a 1310nm FP laser, up to 19dB link budge ensures this module SONET OC-3/SDH STM-1 15km application.

### ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|---|---|---|---|---|---|
| **Operating Temperature** | $T_{op}$ | -40 | | 85 | °C |
| **Storage Temperature** | $T_S$ | -40 | | 85 | °C |
| **Supply Voltage** | $V_{CC}$ | -0.5 | | 4 | V |
| **Relative Humidity** | RH | 0 | | 85 | % |

ATGBICS® All rights reserved. EOE


Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com

# Technical Datasheet

## RECOMMENDED OPERATING ENVIRONMENT:

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|---|---|---|---|---|---|
| **Case Operating Temperature** | $T_C$ | -40 | | 85 | °C |
| **Supply Voltage** | $V_{CC}$ | 3.135 | | 3.465 | V |
| **Supply Current** | Icc | | | 300 | mA |
| **Inrush Current** | $I_{surge}$ | | | Icc+30 | mA |
| **Maximum Power** | $P_{max}$ | | | 1 | W |

## ELECTRICAL CHARACTERISTICS ($T_{OP}$ = -40 to 85°C, VCC = 3.135 to 3.465 Volts)

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter Section:** | | | | | | |
| **Input differential impedance** | $R_{in}$ | 90 | 100 | 110 | Ω | Ω |
| **Single ended data input swing** | $V_{in\ PP}$ | 250 | | 1200 | mVp-p | |
| **Transmit Disable Voltage** | $V_D$ | Vcc – 1.3 | | Vcc | V | 2 |
| **Transmit Enable Voltage** | $V_{EN}$ | Vee | | Vee+ 0.8 | V | |
| **Transmit Disable Assert Time** | $T_{dessert}$ | | | 10 | us | |
| **Receiver Section:** | | | | | | |
| **Single ended data output swing** | Vout, pp | 300 | | 800 | mv | 3 |
| **Data output rise time** | $t_r$ | | | 500 | ps | 4 |
| **Data output fall time** | $t_f$ | | | 500 | ps | 4 |
| **LOS Fault** | $V_{losfault}$ | Vcc – 0.5 | | $V_{CC_host}$ | V | 5 |
| **LOS Normal** | $V_{los\ norm}$ | $V_{ee}$ | | $V_{ee}$+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 LVTTL. 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.

ATGBICS® All rights reserved. EOE


Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com

# Technical Datasheet

## OPTICAL PARAMETERS ($T_{OP}$ = -40 to 85°C, VCC = 3.135 to 3.465 Volts)

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter Section:** | | | | | | |
| **Center Wavelength** | $\lambda_c$ | 1260 | 1310 | 1360 | nm | |
| **Spectral Width** | σ | | | 7.7 | nm | |
| **Optical Output Power** | $P_{out}$ | -15 | | -8 | dBm | 1 |
| **Optical Rise/Fall Time** | $t_r$ / $t_f$ | | | 500 | ps | 2 |
| **Extinction Ratio** | ER | 8.2 | | | dB | |
| **Generated Jitter (peak to peak)** | $J_{TX}$p-p | | | 0.07 | UI | 3 |
| **Generated Jitter (rms)** | $J_{TX}$rms | | | 0.007 | UI | 3 |
| **Eye Mask for Optical Output** | Compliant with G.957(class 1 laser safety) | | | | | |
| **Receiver Section:** | | | | | | |
| **Optical Input Wavelength** | $\lambda_c$ | 1260 | | 1600 | nm | |
| **Receiver Overload** | $P_{ol}$ | -8 | | | dBm | 4 |
| **RX Sensitivity** | Sen | | | -34 | dBm | 4 |
| **RX_LOS Assert** | $LOS_A$ | -45 | | | dBm | |
| **RX_LOS De-assert** | $LOS_D$ | | | -35 | dBm | |
| **RX_LOS Hysteresis** | $LOS_H$ | 0.5 | | | dB | |
| **General Specifications:** | | | | | | |
| **Data Rate** | BR | | 100 | | Mb/s | |
| **Bit Error Rate** | BER | | | $10^{-12}$ | | |
| **Max. Supported Link Length on 9/125μm SMF@100Mb/s** | $L_{MAX}$ | | 15 | | km | |
| **Total System Budget** | LB | 19 | | | 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 $2^{7-1}$ at $10^{-12}$ BER

ATGBICS® All rights reserved. EOE


Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com

# Technical Datasheet

## PIN ASSIGNMENT

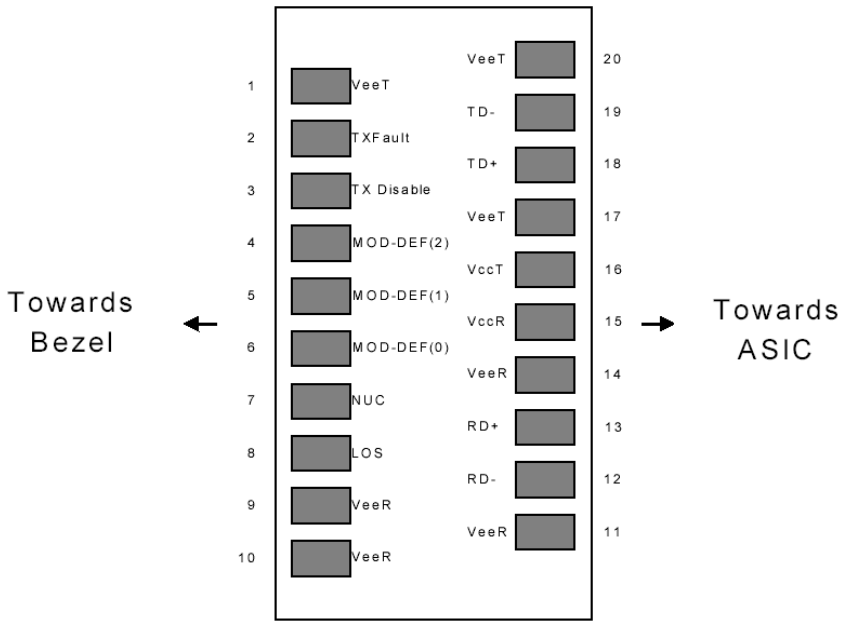



**Diagram of Host Board Connector Block Pin Numbers and Names**

ATGBICS® All rights reserved. EOE


Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com

# Technical Datasheet

## PIN FUNCTION DEFINITIONS

| 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 |
| **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

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 $I^2C$ interface at address A0h.

ATGBICS® All rights reserved. EOE


Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com

# Technical Datasheet

## EEPROM SERIAL ID MEMORY CONTENTS (A0h)

| 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 | |
| **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: |
| **36** | 1 | Reserved | |
| **37-39** | 3 | Vendor OUI | SFP transceiver vendor OUI ID |
| **40-55** | 16 | Vendor PN | Part Number: “AFCT-5765ATLZ-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 |
| **Extended ID Fields** | | | |
| **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 |
| **92-94** | 3 | Reserved | |
| **95** | 1 | CCEX | Check code for the extended ID Fields (addresses 64 to 94) |
| **Vendor Specific ID Fields** | | | |
| **96-127** | 32 | Readable | specific date, read only |
| **128-255** | 128 | Reserved | Reserved for SFF-8079 |

ATGBICS® All rights reserved. EOE


Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com

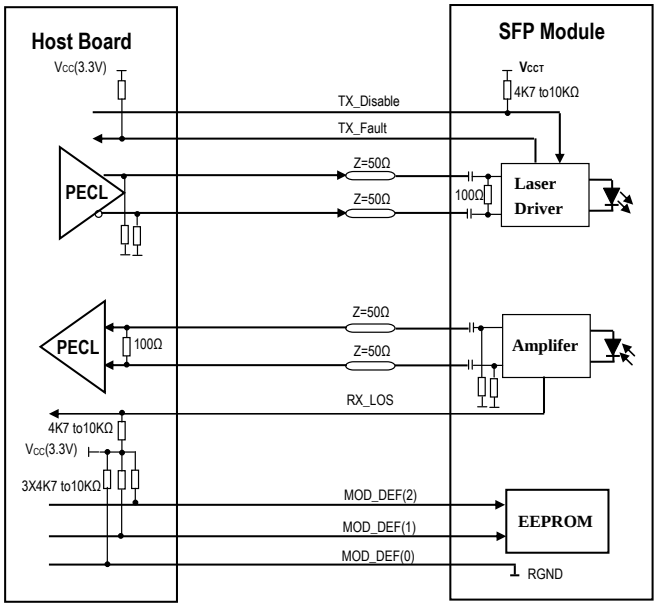
# Technical Datasheet

## REGULATORY COMPLIANCE

The AFCT-5765ATLZ-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 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



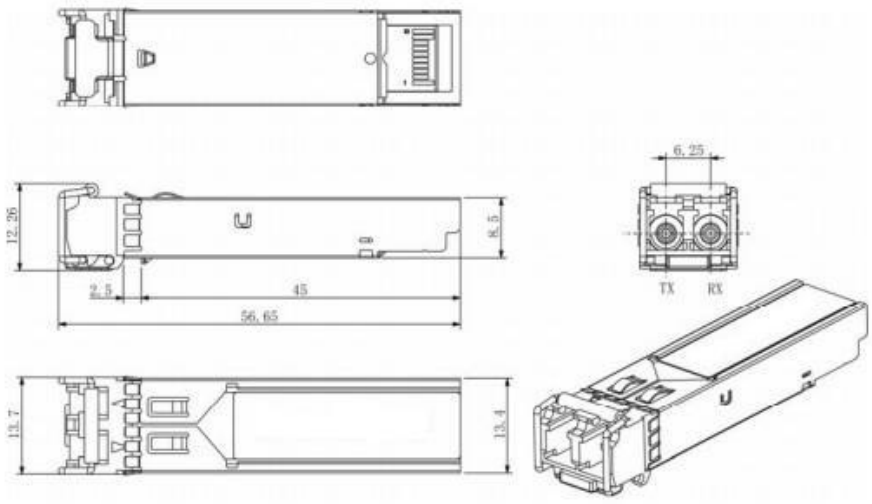

**SFP Host Recommended Circuit**



Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com

# Technical Datasheet

## MECHANICAL DIMENSIONS (UNITS: mm)




**Mechanical Drawing**



Approved Technology Ltd. Wyncombe House, 2A Wyncombe Road, Southbourne, Dorset, BH5 2JU, United Kingdom
ATGBICS.com | Approved-Technology.com | +44 (0) 1202 424 518 | sales@approved-technology.com