

## **AFBR-2CAR20Z-OPC**

Avago® AFBR-2CAR20Z Compatible TAA Compliant 10GBase-AOC SFP+ Active Optical Cable (850nm, MMF, 20m)

### **Features**

- High Speed/ High Density: Supports up to 10Gbps bi-directional operation
- Compliant to SFP MSA Standards
- Reliable VCSEL and PIN photonic devices
- I2C Standard Management Interface
- Excellent High Speed Signal Interface
- Operating Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free



### **Applications:**

- 10G Ethernet
- High Performance Computing, Server, and Data Storage

### **Product Description**

This is an Avago® AFBR-2CAR20Z compatible 10GBase-AOC SFP+ to SFP+ active optical cable that operates over multi-mode fiber with a maximum reach of 20.0m (65.6ft). At a wavelength of 850nm, it has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. This active optical cable is TAA (Trade Agreements Act) compliant, and is built to comply with MSA (Multi-Source Agreement) standards. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

### Absolute Maximum Ratings

| Parameter              | Symbol | Min. | Typ. | Max. | Unit | Notes |
|------------------------|--------|------|------|------|------|-------|
| Storage Temperature    | Tstg   | -40  |      | 85   | °C   |       |
| Operating Temperature  | Tc     | 0    | 25   | 70   | °C   |       |
| Relative Humidity      | RH     | 5    |      | 85   | %    |       |
| Maximum Supply Voltage | Vcc    | 0    |      | 3.6  | V    |       |
| Data Rate              |        |      | 10.3 |      | Gbps |       |

### Electrical Characteristics

| Parameter                        | Symbol | Min.  | Typ. | Max.  | Unit | Notes |
|----------------------------------|--------|-------|------|-------|------|-------|
| Supply Voltage                   | Vcc    | 3.135 | 3.3  | 3.465 | V    |       |
| +3.3V Supply Current             | Icc    |       |      | 290   | mA   |       |
| Transmitter Fault (Tx_Fault)     | VOH    | 2.0   |      | Vcc   | V    | 1     |
| Loss of Signal (LOS)             | VOL    | 0     |      | 0.8   | V    | 1     |
| Transmitter Disable (Tx_Disable) | VIH    | 2.0   |      | Vcc   | V    | 2     |
| MOD_DEF1, MOD_DEF2               | VIL    | 0     |      | 0.8   | V    | 2     |
| Clock Rate-I2C                   |        |       |      |       |      | 3     |

#### Notes:

1. For all control input pins: Tx\_Disable.
2. For all status output pins: Rx\_LOS, Tx\_Fault.
3. For the management interface.

## Optical Characteristics

| Parameter                                     | Symbol | Min. | Typ. | Max. | Unit     | Notes |
|-----------------------------------------------|--------|------|------|------|----------|-------|
| Transmitter                                   |        |      |      |      |          |       |
| Reference Differential Input Impedance        | ZD     |      | 100  |      | $\Omega$ | 1     |
| Signal Speed                                  |        |      | 10.3 |      | Gbps     | 2     |
| Differential Data Input Swing                 | VIN,pp | 180  |      | 700  | mV       |       |
| Receiver                                      |        |      |      |      |          |       |
| Reference Differential Input Impedance        | ZD     |      | 100  |      | $\Omega$ | 1     |
| Signal Speed                                  |        |      | 10.3 |      | Gbps     | 2     |
| Differential Data Output Swing                |        | 150  |      | 850  | mV       |       |
| Differential Data Output Swing When Squelched |        |      |      | 50   | mV       |       |
| Rise/Fall Time (20-80%)                       |        | 24   |      |      | ps       |       |

### Notes:

1. AC coupled inside the AOC module.
2. Tested with PRBS  $2^{31}-1$  and BER: $10^{-12}$ .

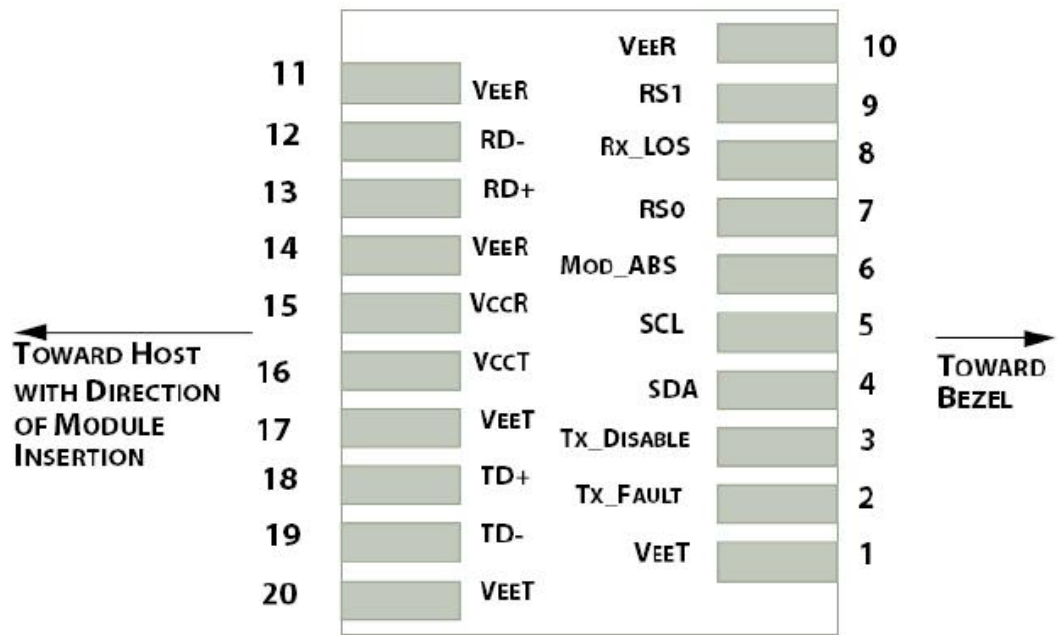
## Pin Descriptions

| Pin | Symbol     | Name/Description                                                          | Notes |
|-----|------------|---------------------------------------------------------------------------|-------|
| 1   | VeeT       | Transmitter Ground.                                                       | 1     |
| 2   | Tx_Fault   | Transmitter Fault (LVTTL-O). "High" indicates a fault condition.          | 2     |
| 3   | Tx_Disable | Transmitter Disable (LVTTL-I). "High" or "open" disables the transmitter. | 3     |
| 4   | SDA        | 2-Wire Serial Interface Data Line. LVCMOS-I/O. MOD_DEF2.                  | 4     |
| 5   | SCL        | 2-Wire Serial Interface Clock Line. LVCMOS-I/O. MOD_DEF1.                 | 4     |
| 6   | MOD_ABS    | Module Absent (Output). Connected to the VeeT or VeeR in the module.      | 5     |
| 7   | RS0        | Rate Select 0. Not Used. Presents high input impedance.                   |       |
| 8   | Rx_LOS     | Receiver Loss of Signal. LVTTL-O.                                         | 2     |
| 9   | RS1        | Rate Select 1. Not Used. Presents high input impedance.                   |       |
| 10  | VeeR       | Receiver Ground.                                                          | 1     |
| 11  | VeeR       | Receiver Ground.                                                          | 1     |
| 12  | RD-        | Inverse Received Data Out (CML-O).                                        |       |
| 13  | RD+        | Received Data Out (CML-O).                                                |       |
| 14  | VeeR       | Receiver Ground.                                                          |       |
| 15  | VccR       | +3.3V Receiver Power.                                                     |       |
| 16  | VccT       | +3.3V Transmitter Power.                                                  |       |
| 17  | VeeT       | Transmitter Ground.                                                       | 1     |
| 18  | TD+        | Transmitter Data In (CML-I).                                              |       |
| 19  | TD-        | Inverse Transmitter Data In (CML-I).                                      |       |
| 20  | VeeT       | Transmitter Ground.                                                       | 1     |

### Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that, on the host board, requires a 4.7k $\Omega$  to 10k $\Omega$  pull-up resistor to the Host\_Vcc.
3. This input is internally biased "high" with a 4.7k $\Omega$  to 10k $\Omega$  pull-up resistor to the VccT.
4. 2-Wire Serial Interface Clock and Data Lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that, on the host board, requires a 4.7k $\Omega$  to 10k $\Omega$  pull-up resistor to the Host\_Vcc.

Pin-Out Connectors



Application Interface Circuit



Mechanical Specifications



| Parameter                               | Symbol | Min. | Typ. | Max. | Unit   | Notes |
|-----------------------------------------|--------|------|------|------|--------|-------|
| Module Retention                        |        | 90   |      | 170  | N      |       |
| Module Insertion                        |        | 0    |      | 18   | N      |       |
| Module Extraction                       |        | 0    |      | 25   | N      |       |
| Cable Pull Strength – Apply Load at 0°  |        | 25   |      |      | N      |       |
| Cable Pull Strength – Apply Load at 90° |        | 20   |      |      | N      |       |
| Cable Bending Radius                    |        | 50   |      |      | mm     |       |
| Insertion/Removal Cycles                |        | 50   |      |      | Cycles |       |