

## Product Datasheet

### AFBR-7QER25Z-C

#### Avago® Compatible 40GBASE-SR4 QSFP+ Active Optical Cable, Active, 25m

##### FEATURES

- QSFP MSA compliant
- Four-channel full-duplex active optical cable
- Transmission data rate up to 11.3Gbit/s per channel
- Reliable VCSEL array technology using multimode fiber
- Available in standard lengths of 3, 5, 10, 15, 20, 30, 50, 100m
- Low power consumption <1.5W
- Operating case temperature 0°C to +70°C
- 3.3V power supply voltage
- RoHS 6 compliant
- Hot Pluggable QSFP form factor

##### APPLICATIONS

- Infiniband QDR/DDR/SDR
- Datacenter
- 40G Ethernet
- 4G/8G/10G Fibre Channel

##### DESCRIPTION

ATGBICS AFBR-7QER25Z-C QSFP+ active optical cables are a high performance, low power consumption, long reach interconnect solution supporting InfiniBand QDR/DDR/SDR, 12.5G/10G/8G/4G/2G fiber channel, PCIe and SAS. It is compliant with the QSFP MSA and IEEE P802.3ba. WAREX QSFP AOC is an assembly of 4 full-duplex lanes, where each lane is capable of transmitting data at rates up to 11.3Gb/s, providing an aggregated rate of 45.2Gb/s. WAREX QSFP+ AOC is one kind of parallel transceiver which provides increased port density and total system cost savings.

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### Absolute Maximum Ratings

| Parameter                         | Symbol | Min  | Max     | Unit |
|-----------------------------------|--------|------|---------|------|
| Storage Temperature               | TST    | -40  | 85      | degC |
| Relative Humidity(non-condensing) | RH     | 0    | 85      | %    |
| Operating Case Temperature        | TOPC   | 0    | 70      | degC |
| Supply Voltage                    | VCC    | -0.3 | 3.6     | V    |
| Input Voltage                     | Vin    | -0.3 | Vcc+0.3 | V    |

### Note:

1. The operation in excess of any absolute maximum ratings might cause permanent damage to this module

### Recommended Operating Conditions and Supply Requirements

| Parameter                    | Symbol      | Min  | Typical | Max  | Unit |
|------------------------------|-------------|------|---------|------|------|
| Operating Case Temperature   | TOPC        | 0    |         | 70   | degC |
| Power Supply Voltage         | VCC         | 3.13 | 3.3     | 3.47 | V    |
| Power Consumption            |             | -    |         | 1.5  | W    |
| Data Rate                    | DR          | 1    | 10.3    | 11.3 | Gbps |
| Data Speed Tolerance         | $\Delta$ DR | -100 |         | +100 | ppm  |
| Link Distance with OM3 fiber | D           | 0    |         | 100  | m    |

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### Electrical Specifications

| Parameter                             | Symbol           | Min     | Typical | Max  | Unit  |
|---------------------------------------|------------------|---------|---------|------|-------|
| Differential input impedance          | Zin              | 90      | 100     | 110  | ohm   |
| Differential Output impedance         | Zout             | 90      | 100     | 110  | ohm   |
| Differential input voltage amplitude  | $\Delta V_{in}$  | 300     |         | 1100 | mVp-p |
| Differential output voltage amplitude | $\Delta V_{out}$ | 500     |         | 800  | mVp-p |
| Bit Error Rate                        | BR               |         |         | E-12 |       |
| Input Logic Level High                | V <sub>IH</sub>  | 2.0     |         | VCC  | V     |
| Input Logic Level Low                 | V <sub>IL</sub>  | 0       |         | 0.8  | V     |
| Output Logic Level High               | V <sub>OH</sub>  | VCC-0.5 |         | VCC  | V     |
| Output Logic Level Low                | V <sub>OL</sub>  | 0       |         | 0.4  | V     |

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### Pin Descriptions

| PIN | Logic       | Symbol  | Name/Description                     | Note |
|-----|-------------|---------|--------------------------------------|------|
| 1   |             | GND     | Ground                               | 1    |
| 2   | CML-I       | Tx2n    | Transmitter Inverted Data Input      |      |
| 3   | CML-I       | Tx2p    | Transmitter Non-Inverted Data output |      |
| 4   |             | GND     | Ground                               | 1    |
| 5   | CML-I       | Tx4n    | Transmitter Inverted Data Input      |      |
| 6   | CML-I       | Tx4p    | Transmitter Non-Inverted Data output |      |
| 7   |             | GND     | Ground                               | 1    |
| 8   | LVTLL-I     | ModSelL | Module Select                        |      |
| 9   | LVTLL-I     | ResetL  | Module Reset                         |      |
| 10  |             | VccRx   | + 3.3V Power Supply Receiver         | 2    |
| 11  | LVC MOS-I/O | SCL     | 2-Wire Serial Interface Clock        |      |
| 12  | LVC MOS-I/O | SDA     | 2-Wire Serial Interface Data         |      |
| 13  |             | GND     | Ground                               |      |
| 14  | CML-O       | Rx3p    | Receiver Non-Inverted Data Output    |      |
| 15  | CML-O       | Rx3n    | Receiver Inverted Data Output        |      |
| 16  |             | GND     | Ground                               | 1    |
| 17  | CML-O       | Rx1p    | Receiver Non-Inverted Data Output    |      |
| 18  | CML-O       | Rx1n    | Receiver Inverted Data Output        |      |
| 19  |             | GND     | Ground                               | 1    |
| 20  |             | GND     | Ground                               | 1    |
| 21  | CML-O       | Rx2n    | Receiver Inverted Data Output        |      |
| 22  | CML-O       | Rx2p    | Receiver Non-Inverted Data Output    |      |

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|    |         |         |                                     |   |
|----|---------|---------|-------------------------------------|---|
| 23 |         | GND     | Ground                              | 1 |
| 24 | CML-O   | Rx4n    | Receiver Inverted Data Output       | 1 |
| 25 | CML-O   | Rx4p    | Receiver Non-Inverted Data Output   |   |
| 26 |         | GND     | Ground                              | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present                      |   |
| 28 | LVTTL-O | IntL    | Interrupt                           |   |
| 29 |         | VccTx   | +3.3 V Power Supply transmitter     | 2 |
| 30 |         | Vcc1    | +3.3 V Power Supply                 | 2 |
| 31 | LVTTL-I | LPMode  | Low Power Mode                      |   |
| 32 |         | GND     | Ground                              | 1 |
| 33 | CML-I   | Tx3p    | Transmitter Non-Inverted Data Input |   |
| 34 | CML-I   | Tx3n    | Transmitter Inverted Data Output    |   |
| 35 |         | GND     | Ground                              | 1 |
| 36 | CML-I   | Tx1p    | Transmitter Non-Inverted Data Input |   |
| 37 | CML-I   | Tx1n    | Transmitter Inverted Data Output    |   |
| 38 |         | GND     | Ground                              | 1 |

### Notes:

1. Module circuit ground is isolated from module chassis ground within the module. GND is the symbol for signal and supply (power) common for QSFP modules
2. The connector pins are each rated for a maximum current of 500mA

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### Power Supply Filtering

The host board should use the power supply filtering shown in Figure1

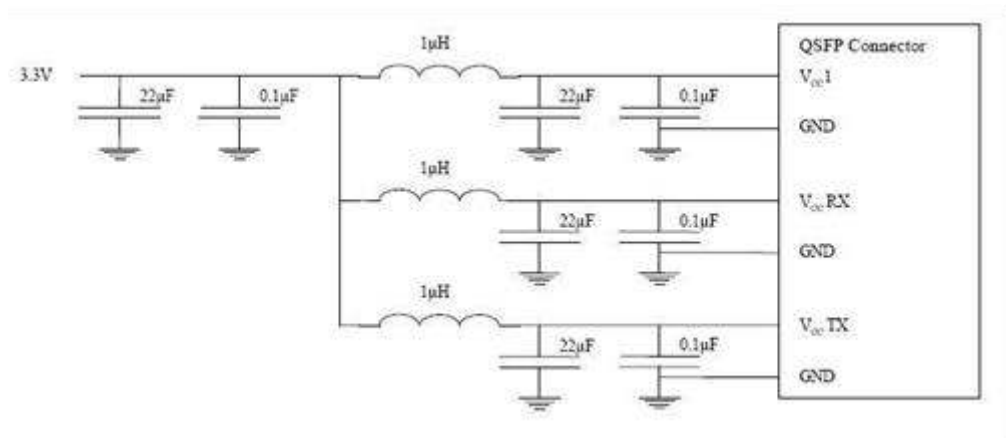


Figure1. Host Board Power Supply Filtering

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### EEPROM Serial ID Memory Contents:

#### Serial ID: Data Fields (Page 00)

| Address | Size (Bytes) | Name                            | Description of Base ID Field  | Optical Module |
|---------|--------------|---------------------------------|---|----------------|
| 128     | 1            | Identifier                      | Identifier Type of serial Module  | R              |
| 129     | 1            | Ext. Identifier                 | Extended Identifier of Serial Module                                    | R              |
| 130     | 1            | Connector                       | Code for connector type   | R              |
| 131-138 | 8            | Specification compliance        | Code for electronic compatibility or optical                            | R              |
| 139     | 1            | Encoding                        | Code for serial encoding algorithm                                      | R              |
| 140     | 1            | BR, nominal                     | Nominal bit rate, units of 100 Mbits/s                                  | R              |
| 141     | 1            | Extended rate select Compliance | Tags for extended rate select compliance                                | R              |
| 142     | 1            | Length (SMF)                    | Link length supported for SMF fiber in km (note 1)                      | R              |
| 143     | 1            | Length (OM3 50um)               | Link length supported for EBW 50/125 um fiber (OM3),                    | R              |
| 144     | 1            | Length (OM2 50um)               | Link length supported for 50/125 um fiber (OM2), units of 1m (note 1)   | R              |
| 145     | 1            | Length (OM1 62.5um)             | Link length supported for 62.5/125 um fiber (OM1), units of 1m (note 1) | R              |
| 146     | 1            | Length (Copper)                 | Link length of copper or active cable, units of 1m (note 1) Link length | R              |
| 147     | 1            | Device tech                     | Device technology   | R              |
| 148-163 | 16           | Vendor name                     | QSFP+ vendor name (ASCII)   | R              |
| 164     | 1            | Extended Module                 | Extended Module codes for InfiniBand                                    | R              |
| 165-167 | 3            | Vendor OUI                      | QSFP+ vendor IEEE company ID  | R              |
| 168-183 | 16           | Vendor PN                       | Part number provided by QSFP+ vendor (ASCII)                            | R              |

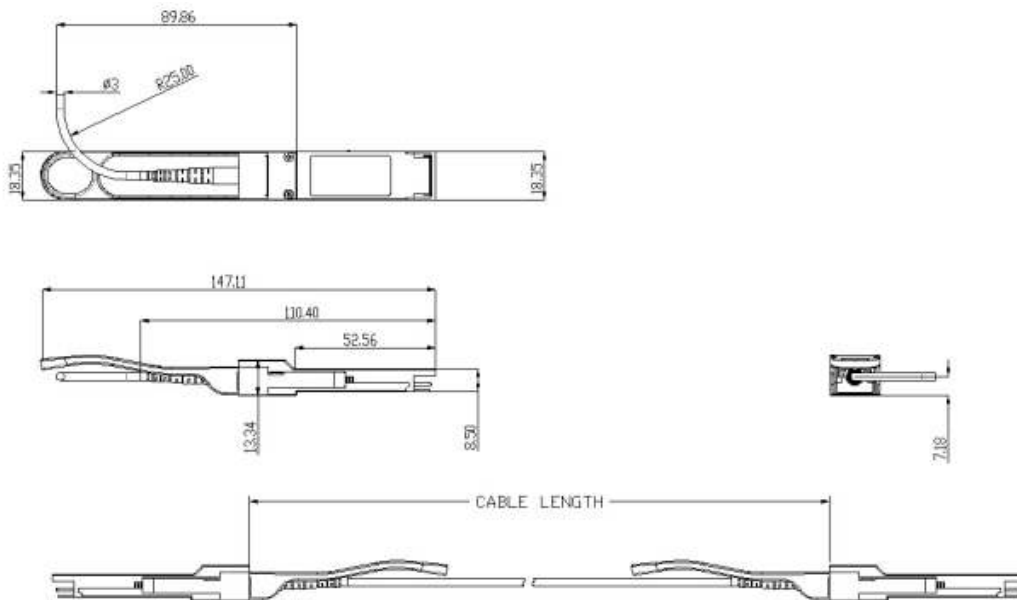
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|                           |    |  |   |   |
|---------------------------|----|--|---|---|
| <b>184-185</b>            | 2  | Vendor rev                             | Revision level for part number provided by vendor (ASCII)   | R |
| <b>186-187</b>            | 2  | Wavelength or Copper cable Attenuation | Nominal laser wavelength (wavelength=value/20 in nm) or copper cable  | R |
| <b>188-189</b>            | 2  | Wavelength tolerance                   | Guaranteed range of laser wavelength (+/- value) from nominal wavelength. (Wavelength Tol. = value/200 in nm) | R |
| <b>190</b>                | 1  | Max case temp.                         | Maximum case temperature in degrees C   | R |
| <b>191</b>                | 1  | CC_BASE                                | Check code for base ID fields (addresses 128-190)   | R |
| <b>192-195</b>            | 4  | Options                                | Rate Select, TX Disable, TX Fault, LOS, Warning indicators for: Temperature, VCC, RX power, TX Bias           | R |
| <b>196-211</b>            | 16 | Vendor SN                              | Serial number provided by vendor (ASCII)  | R |
| <b>212-219</b>            | 8  | Date Code                              | Vendor's manufacturing date code  | R |
| <b>220</b>                | 1  | Diagnostic Monitoring Type             | Indicates which types of diagnostic monitoring are implemented (if any) in the Module. Bit 1,0 Reserved       | R |
| <b>221</b>                | 1  | Enhanced Options                       | Indicates which optional enhanced features are implemented in the Module.                                     | R |
| <b>222</b>                | 1  | Reserved                               |   |   |
| <b>223</b>                | 1  | CC_EXT                                 | Check code for the Extended ID Fields (addresses 192-222)   | R |
| Vendor Specific ID Fields |    |  |   |   |
| <b>224-255</b>            | 32 | Vendor Specific EEPROM                 |   |   |



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### Mechanical Information



### Ordering Information

| Length | Note      |
|--------|-----------|
| 3m     | OM3 Cable |
| 5m     | OM3 Cable |
| 10m    | OM3 Cable |
| 20m    | OM3 Cable |
| 30m    | OM3 Cable |
| 50m    | OM3 Cable |
| 70m    | OM3 Cable |
| 100m   | OM3 Cable |