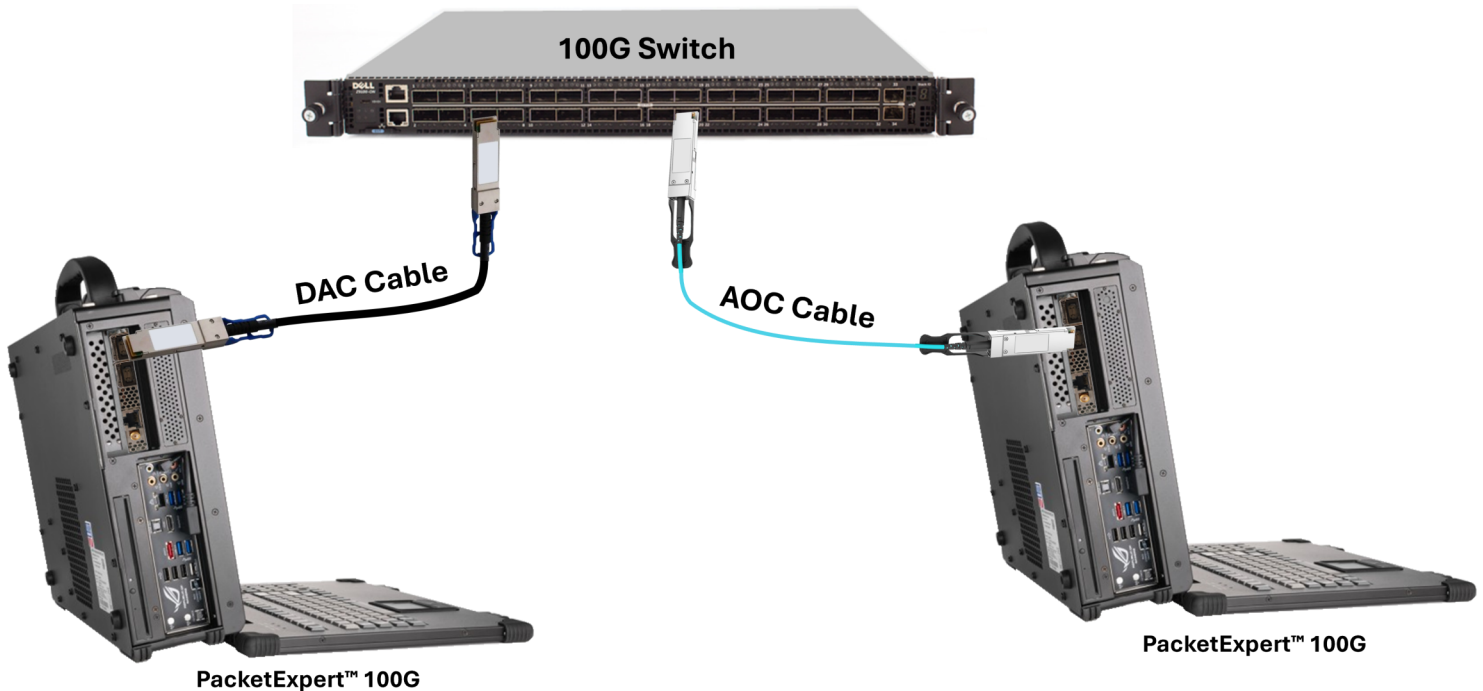# AOC and DAC Cables for PacketExpert™ 100G

Overview

Direct Attach Cable (**DAC Cables**) and **Active Optical Cable** (**AOC Cables**) are widely used in data centers, where typically the connectivity requirements are for a short distance. Advantages of **DAC/AOC** cables are low latency, low power and low cost. DAC/AOC cables are available in 10G SFP+, 25G SFP28, 40G QSFP+, and 100G QSFP28 data rates.

DAC is comprised of a **Twinax** copper cable terminated with SFP+/SFP28/QSFP+/QSFP56/QSFP28 connectors on both ends, which can provide an electrical connection directly into active equipment. DAC cables transmit electrical signals directly over copper cable. DAC cables are meant for very short distances, up to 5m in length. Generally DAC cables are used to connect switches, servers and storage within a single rack in data centers.

AOC consists of a multimode fiber optic cable terminated with SFP form factor connectors on both ends. It converts electrical to optical for transmission over the optical cable and vice versa on the receiving side. AOC cables support a little longer distance than DAC cables, up to 100m. Generally AOC cables are used to connect switches, servers and storage between different racks inside data centers. PacketExpert™ 100G supports both DAC and AOC cables.

AOC Specifications and Compatibility

Typical Compatible Modules:

- **100G** – Fiber mall QSFP28-100G-AOC-xM (x = Length)
- **50G** – QSFP56 is more common but not compatible with the PacketExpert™ 100G due to the 50G rate
- **40G** – Fiber Mall QSFP-40G-AOC-xM
- **25G** – Fiber Mall SFP28-25G-AOC-xM (x = Length)
- **10G** – Fiber Mall SFP-10G-AOC-xM (x = Length)
- **1G** – Not common, typical sources are not available

Advantages:

- Lighter Weight
- Advantage of Longer Distances for larger server clusters (up to about 70m to 100m)
- More Reliable – Better BER – 10^{-15}
- Not susceptible to EMI with longer distances
- Typical Length Sizes – 1m, 2m, 3m, 5m, 7m, 15m, 20m, 30m, 50m, 75m, 100m

Disadvantages:

- More expensive than DAC modules
- More Power consumption

DAC Specifications and Compatibility

The PacketExpert ™100G was tested with modules below 5 meters. The software will detect if the DAC cable is installed and will set the receive equalization to compensate for the extra length of cable. Only 100G and 25G require the extra receive equalization.

Typical Compatible Modules:

- **100G** – FS, QSFP28-100G-PC05 (x=Length)
- **40G** – FS, QSFP-40G-PC005 (x=Length)
- **25G** – FS, SFP-25G-PC05 (x=Length)
- **10G** – FS, SFP-10G-PC05 (x = Length)
- Typical lengths – 0.5m, 0.65m, 1m, 1.2m, 1.5m, 2m, 3m, 5m

Advantages:

- Cost-effective copper solution for cables less than 5 meters
- Lowest total system power solution
- Flexible to bend

Disadvantages:

- Cable length
- Higher cable weight
- Lowest cable reach
- Larger cable bend diameter
- Higher EMI than AOC cables
- Thicker cable

Detection of AOC and DAC Cable in PacketExpert™ 100G

The **AOC** cable is detected as shown in the below screenshot.

SFP Information

Description	Select Port — Port1 ▼	Select Port — Port2 ▼
Identifier	QSFP28 or later with SFF-8636 management interface	QSFP28 or later with SFF-8636 management interface
Connector Type	MPO 1x12 (Multifiber Parallel Optic)	MPO 1x12 (Multifiber Parallel Optic)
Ethernet Compliance	100GBASE-SR4 or 25GBASE-SR	100GBASE-SR4 or 25GBASE-SR
Encoding	64B/66B	64B/66B
Signaling rate, nominal	> 25.4 GBd	> 25.4 GBd
Length (SMF)	-	-
Length (OM3 50um)	200m	200m
Length (OM2 50um)	-	-
Length (OM1 62.5um)	-	-
Length (OM4 50um)	6m	6m
Device technology	850 nm VCSEL	850 nm VCSEL
Vendor name	FiberMall	FiberMall
Vendor OUI	1534464	1534464
Vendor Part Number	QSFP28-100G-AOC-	QSFP28-100G-AOC-
Wavelength	850 nm	850 nm
Vendor Revision	A0	A0
Vendor Serial Number	MC243650005	MC243650005
Vendor Date Code	09/12/24	09/12/24

The **DAC** cable is detected as shown in the below screenshot.

SFP Information		
Description	Select Port Port1 ▼	Select Port Port2 ▼
Identifier	-	QSFP28 or later with SFF-8636 management interface
Connector Type	-	No separable connector
Ethernet Compliance	-	100GBASE-CR4 or 25GBASE-CR CA-25G-L
Encoding	-	Unspecified
Signaling rate, nominal	-	> 25.4 GBd
Length (SMF)	-	-
Length (OM3 50um)	-	-
Length (OM2 50um)	-	-
Length (OM1 62.5um)	-	-
Length (OM4 50um)	-	2m
Device technology	-	Copper cable unequalized
Vendor name	-	FS
Vendor OUI	-	182528
Vendor Part Number	-	QSFP28-100G-DAC
Wavelength	-	77 nm
Vendor Revision	-	A
Vendor Serial Number	-	S1807463922-2
Vendor Date Code	-	08/03/18

Buyer's Guide

Item No	Product Description
PXX100	PacketExpert™ 100G Platform (1G, 10G, 25G), All Port BERT, BERT/Loopback, RFC2544, Y.1564 and MTGA
PXX101	Basic Software (Required for PXX100)
SA020aa	QSFP28-100G, 5m DAC Cable
SA020ab	QSFP-40G, 5m DAC Cable
SA020ac	SFP28 25G, 5m DAC Cable
SA020ad	SFP+ 10G, 5m DAC Cable
SA020ae	QSFP 100G, 5m AOC Cable (MM)
SA020af	QSFP+ 40G, 5m AOC Cable (MM)
SA020ag	SFP28 25G, 5m AOC Cable (MM)
SA020ah	SFP 10G, 5m AOC Cable (MM)

Note: PCs which include GL hardware/software require Intel or AMD processors for compliance.

For more information, visit PacketExpert™ 100G- Comprehensive Ethernet/IP Testing Solution webpage.

GL Communications Inc.