Optical Passives for HFC, FTTx & RFoG Solutions

- Full Line of Optical Passives and Accessories
- WDM/CWDM/DWDM
- Optical Splitters
- Dispersion Compensation Module (DCM)
- ITU G.694 standard compliant
- Excellent Wavelength Stability
- Cost Effective Solution
- High Port Isolation
- Low Insertion Loss
- Flexibility for Customization

ACT offers a complete line of DWDMs, CWDMs, WDMs, OADMs, Couplers, DCM, Optical Shelf and Accessories. The Wavelength Division Multiplexers (WDMs) feature low insertion loss, high isolation and excellent wavelength stability.

The CWDM/DWDMs are designed to multiplex (mux) or de-multiplex (demux) optical signals in full optical spectrum with CWDM/DWDM multiple channels at an ITU standards ITU-T defined spacing. It comes as different form factor packages, 1RU 19” rack-mount chassis, standard LGX modules or flat box assemblies.

ACT also developed special range of WDM units which are suitable for HFC, FTTx (P2P, P2MP), RFOG (Radio Frequency over Glass) applications, permitting DOCSIS and HFC to operate over a EPON/GPON compliant Passive Optical Network (PON) as commonly deployed for Fibre to the Home (FTTH) developments solution in high density FTTX networks to bring the video services to business and home premises.

Key Features

- Cost-effective Full Line of Optical Passives and Accessories
- WDM/CWDM/DWDM/OADM, Optical Coupler, Attenuator etc.
- ITU G.694 standard compliant
- Excellent Wavelength Stability
- High Port Isolation, low Insertion Loss
- Customization option available
- SC/APC, LC/APC, FC/APC and E2000/APC connectors available.
- Optional 1311 nm port for forward path transmission to HFC nodes
- Either single port or with internal splitter to match number of CWDM ports for feeding multiple HFC nodes over one fibre
- Options for assembly into 19" sub-racks, LGX chassis, or flat box, ready for deployment.

Sample 1RU WDM Block Diagram (P2P with Video Overlay)

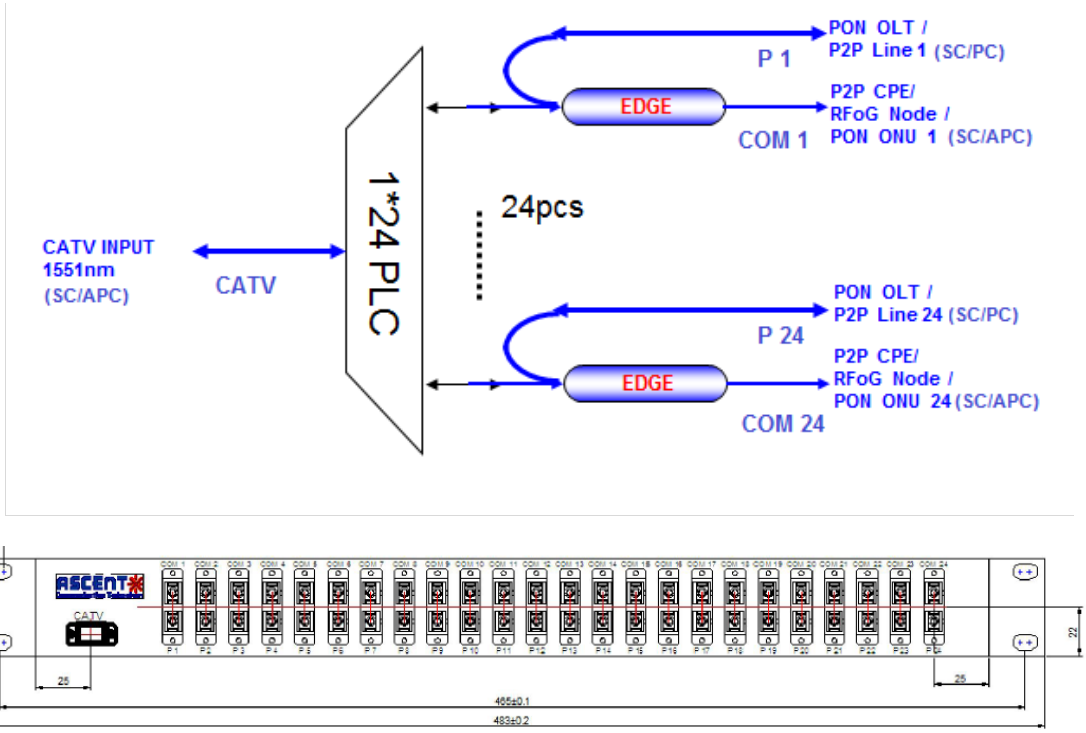
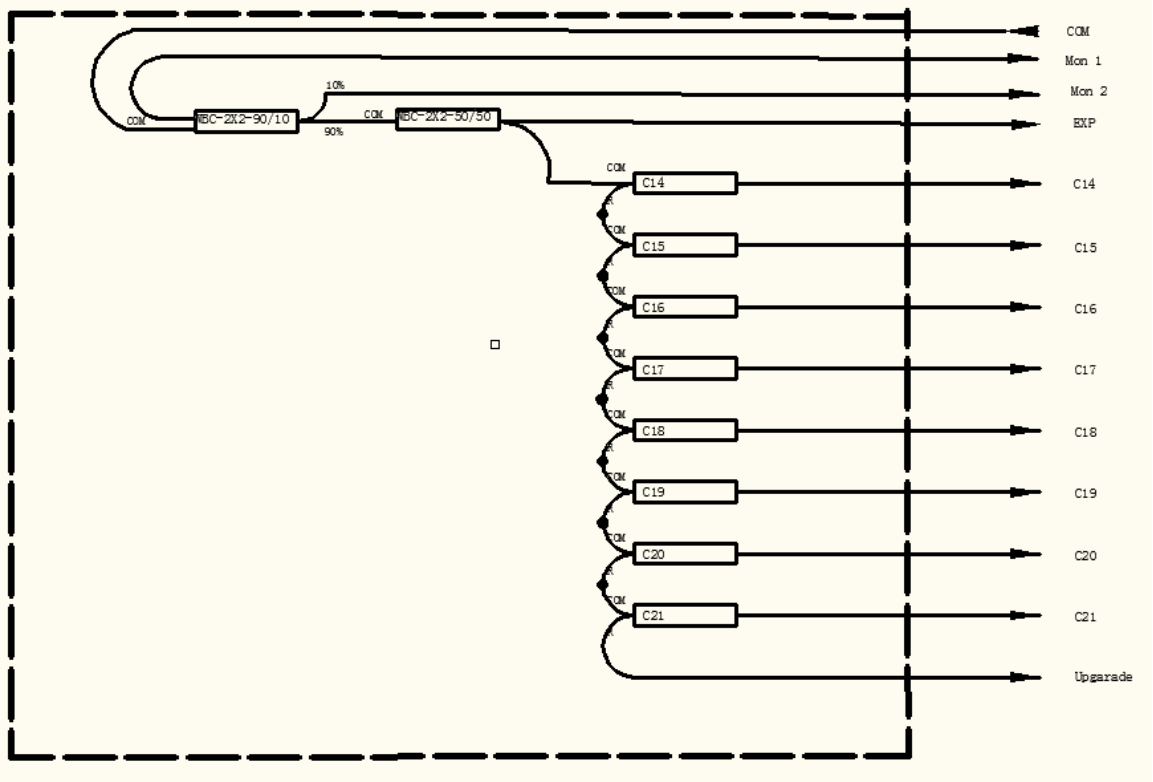


Figure 1. Coarse wavelength division multiplexer for 1551 nm CATV overlay in P2P Active Ethernet applications. 24-port CATV RF overlay splitter with 24 x P2P Active Ethernet ports.

Com (ITU C14 to 61)



DWDM Specifications

ACT Optical Passives DWDM (AOPD)

Optical Specification

Operating Wavelength	1520 nm to 1580 nm
Channel Spacing	100 GHz or 200 GHz
Channels	2, 4, 6, 8, 10 or 12
Channel Pass Band	ITU ±0.22 nm (100 GHz) , ITU ±0.50 nm (200 GHz)
Pass Band Flatness	≤ +/-0.5 dB
Insertion Loss 2 ch	1.2 dB Max
Insertion Loss 4 ch	1.7 dB Max
Insertion Loss 8 ch	2.5 dB Max
Insertion Loss 10 ch	3.0 dB Max
Adjacent Channel Isolation	≥ 30 dB
Non-adjacent Channel Isolation	≥ 45 dB
Directivity	≥ 50 dB
Return Loss	≥ 45 dB

General Specifications

Operating Temp	-40 °C to 85 °C
Storage Temp	-40 °C to 85 °C
Operating relative humidity	5 % to 95 %
Dimensions (W × D × H)	Various by model LGX : industry standard Flat Box: 100 mm × 80 mm × 10.5 mm(<=8 output ports), or 140 mm × 115 mm × 18 mm (>8 output ports)
Weight	Note
Ship weight	Note

Note: Contact ACT for different packaging options. Weight will vary depending on model.
Losses excluding connector Loss (a pair of connector loss max: 0.5dB)

100 / 200 GHz Channel Spacing

ITU Channel	Wavelength (nm)	Color Reference
21	1560.61	RED
22	1559.79	
23	1558.98	
24	1558.17	
25	1557.36	
26	1556.96	
27	1555.75	
28	1554.94	
29	1554.13	
30	1553.33	
31	1552.52	
32	1551.72	
33	1550.92	
34	1550.12	
35	1549.32	
36	1548.51	
37	1547.72	Not used with RED/BLUE filtering
38	1546.92	
39	1546.12	
40	1545.32	
41	1544.53	
42	1543.73	
43	1542.94	
44	1542.14	
45	1541.35	BLUE
46	1540.56	
47	1539.77	
48	1538.98	
49	1538.19	
50	1537.40	
51	1536.61	
52	1535.82	
53	1535.04	
54	1534.25	
55	1533.47	
56	1532.68	
57	1531.90	
58	1531.12	
59	1530.33	

Table 1: Reference ITU DWDM Chart

Optical Splitters Specifications 1x2

ACT Optical Passives Optical Splitters (AOS)

Optical Specification

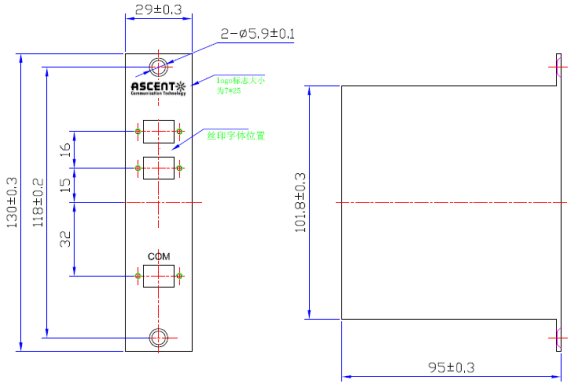
Operating wavelength	1310 and 1550 +/- 40 nm
Configuration	1x2
Insertion Loss	Various See below chart
Uniformity (dB)	<=0.6 dB
Directivity	≥ 50 dB
Polarization Dependent Loss	<=0.1dB
Return loss	≥ 55 dB
Connectors	SC/APC, SC/PC, LC/APC, LC/PC
Fiber Types	900um, 2mm, or 3mm

General Specifications

Operating Temp, °C	-20 to 70
Storage Temp, °C	-40 to 85
Operating relative humidity, %	5 to 95
Dimensions (W x D x H)	LGX, Splice Tube or Flat Box (ABS): 100×80×10.5 mm
Weight, kg	Weight varies depending on model.

Split ratio	**Maximum Insertion Loss dB**
50/50	3.6/3.6
55/45	3.1/4.3
60/40	2.8/4.8
65/35	2.3/5.3
70/30	2.1/6.1
75/25	1.6/7.2
80/20	1.3/8.0
85/15	1.2/9.6
90/10	0.9/11.3
95/05	0.6/15

Note: Contact ACT for different packaging options. Losses excluding connector Loss (a pair of connector loss max: 0.5dB)



Optical Shelf and Frame Specifications

ACT Optical Passive Shelf and Optical Passive Distribution Frame

- Standard 19" cabinet design for convenient and quick installation.
- Specially-structured front-back latch of the cases facilitates easier adjusting and suitable for different kind of frame installation.
- Fiber can be led in from both the left and the right sides with complete front operations.
- Each module has a reliable restricting and positioning mechanism to ensure correct operations.
- Patent design for protecting bare fiber fusing point.
- 12 slots for the Shelf and 12 core fiber distribution module to utilize the place and shrink the box size
- Convenient cable fixing device

Optical Shelf Specification

Material	1.5 mm thick cold-rolled sheet
Capacity	Up to 72 interconnectors or patches, 12 LGX modules (4RU)
Dimensions (W × H × D)	With mounting bracket 483 mm × 177 mm × 305 mm (4RU) With mounting bracket 483 mm × 44 mm × 320 mm (1RU)
Model Number	AOP-LGX-CH (4RU), AOP-LGX-CH-1RU (1RU up to 6 LGX Module),

Optical Distribution Frame Specification

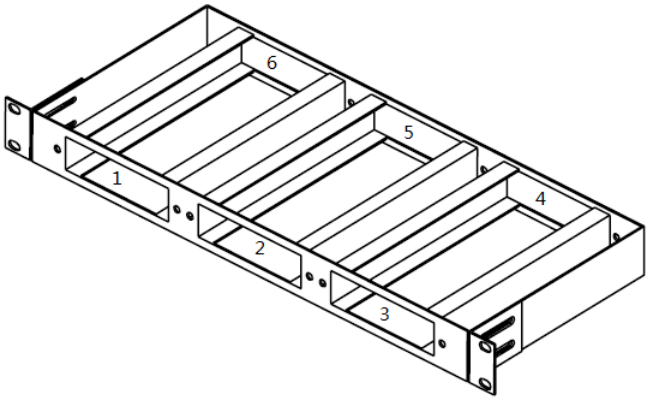
Material	1.5 mm thick cold-rolled sheet, 1 to 4RU
Insertion Loss	≤0.5dB
Optical Connector	AS: SC/APC; US: SC/UPC; AF: FC/APC or UF: FC/UPC
Return Loss	PC ≥ 40dB, UPC ≥ 50dB, APC ≥ 60dB
Model Number	AOP-ODF-DXX-YY (XX:36, 48, 72, 96 Fiber, YY: Optical Connector)

General Specifications

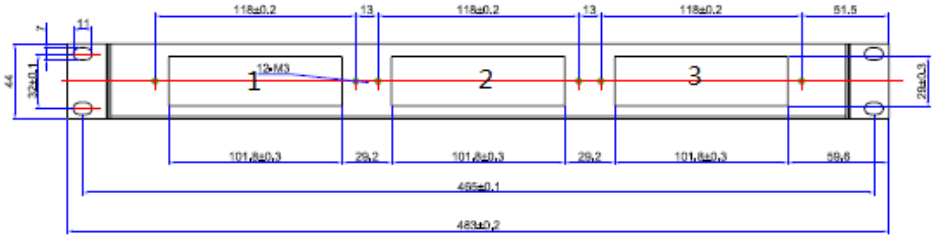
Operating Temp	-40 °C to 85 °C
Storage Temp	-40 °C to 85 °C
Operating relative humidity	5 % to 95 %
Weight	Varies by model types

Note: Contact ACT for different packaging options. 8° angle polished for all APC connectors.

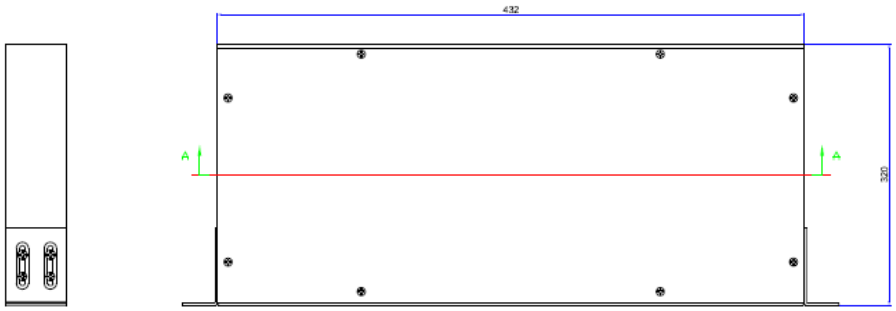
ACT Optical Passive Shelf 1RU (6 LGX slots) Mechanical Design Diagram:



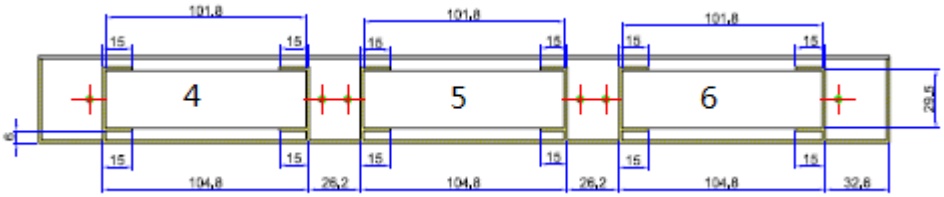
Top View without Cover



Front View with Dimension



Top and Side View



Back View with Dimension

Optical Splice Enclosure Specification

ACT Optical High Density Fiber Enclosure

- High strength, low weight, low cost, non-metallic shell
- Suitable for aerial, underground duct or direct burial applications
- Can be used in through, branch or mid span splice locations
- Holds up to 144 splices
- Cable entry/exit ports
- Spacious buffer tube storage system and fiber management trays
- Pressure testing valve and earth deriving device
- Integrated seal, air tight and water proof
- Ideal for cable repair
- RoHS compliant

Optical Splice Enclosure Specification

Sealing Structure	Heat-shrinkable Sealing	Mechanical Sealing
Maximum Splices Capacity	24 to 144	240
Core Capacity per Tray	24	12, 24, 48
Cable Ports	9	6
Cable Diameter (max)	Φ38 mm	Φ17 mm
Dimensions (D × H)	ϕ 470 mm × 210 mm	Φ220 mm × 480 mm
Model Number	AOP-HSE-9-xx (xx: splices)	AOP-MSE-6-xx (xx: splices)

General Specifications

Operating Temp	-40 °C to 85 °C
Storage Temp	-40 °C to 85 °C
Operating relative humidity	5 % to 95 %
Weight	Various by model types

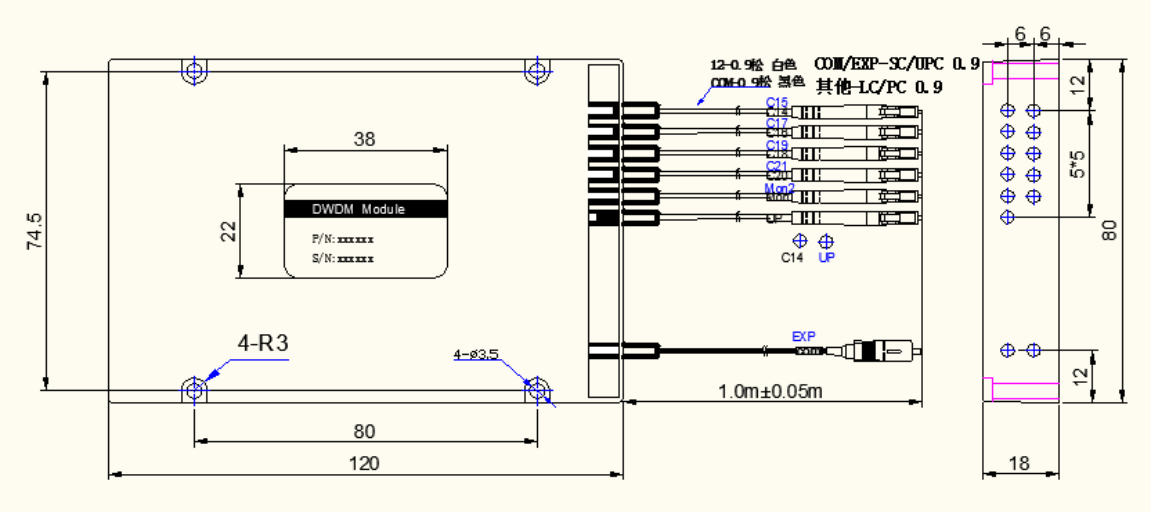
Note: Contact ACT for different packaging options. 8° angle polished for all APC connectors.

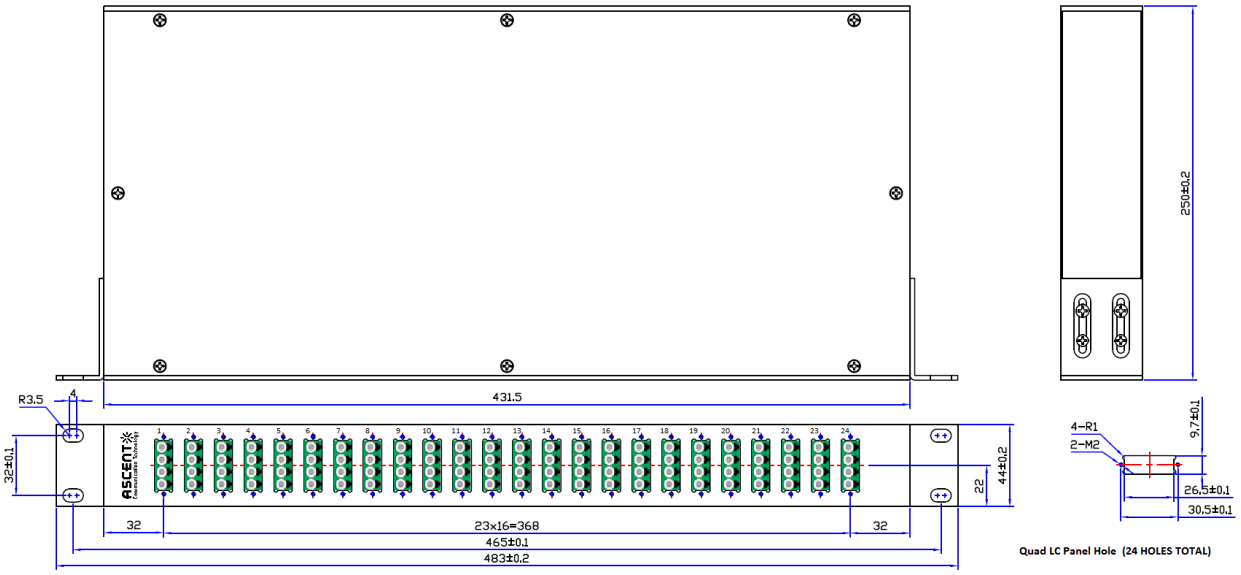
8-wavelength Optical MUX/DEMUX

Parameters		AOPD-08-A6-1-14-0-F-C
Wavelength Range		ITU channels 186.6 to 196.1 THz
Channel Center Wavelength		ITU channels
Channel Spacing		100 GHz
Channel Passband (@-0.5dB)		0.22 nm
Channel No.		8 λ
Insertion Loss [1, 2]	Mon2 port	≤ 12 dB
	EXP port	≤ 4.8 dB
	Else port	≤ 7.8 dB
Adjacent Channel Isolation		≥ 30 dB
Non-adjacent Channel Isolation		≥ 45 dB
PDL		≤ 0.30 dB
Return loss		≥ 45 dB
Connector Type		COM, EXP:SC/UPC; Else: LC/UPC
Operating Temperature		-10 °C to +70 °C
Storage Temperature		-40 °C to +85 °C
Relative Humidity		5 % to 95 %
Dimension		1U (483 mm × 250 × 44.5 mm)

Note: [1] Within operating temperature and SOP.

[2] Excluding Connectors.(*IL is 0.2 dB higher for connector added.)



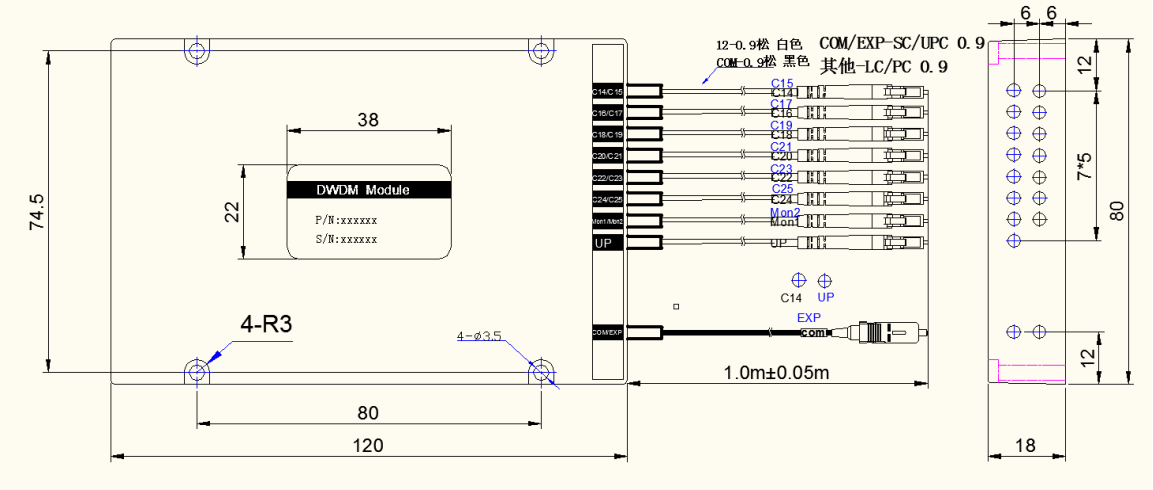


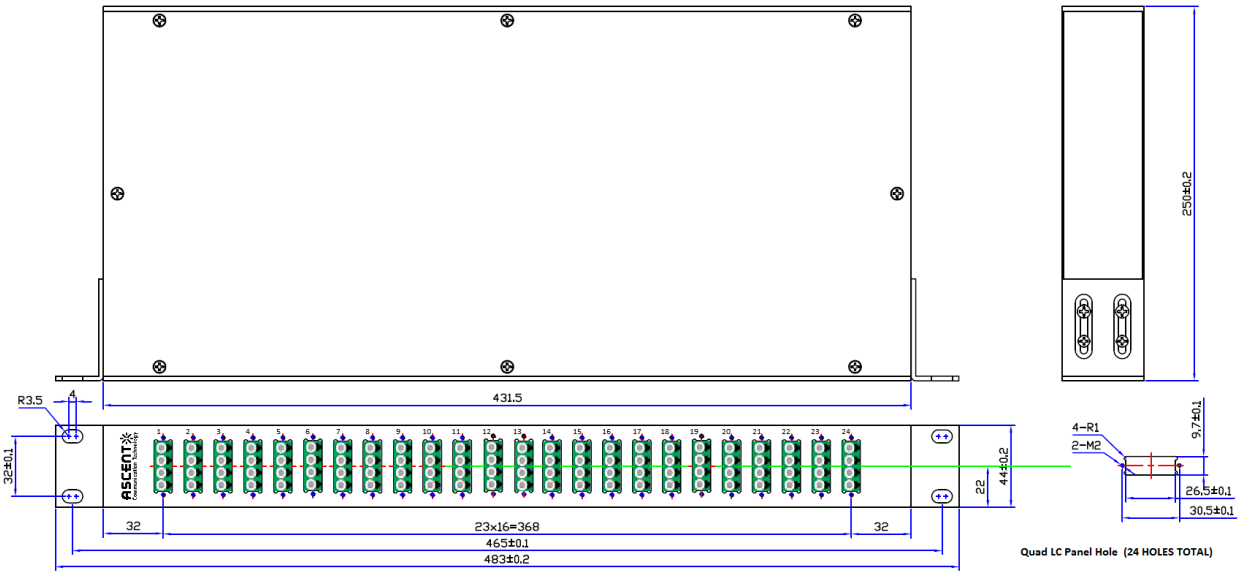
12-wavelength Optical MUX/DEMUX

Parameters		AOPD-12-A4-1-14-0-F-C
Wavelength Range		ITU channels 186.6 to 196.1 THz
Channel Center Wavelength		ITU channels
Channel Spacing		100 GHz
Channel Passband (@-0.5dB)		0.22 nm
Channel No.		12 λ
Insertion Loss [1, 2]	Mon2 port	≤ 12 dB
	EXP port	≤ 4.8 dB
	Else port	≤ 9.3 dB
Adjacent Channel Isolation		≥ 30 dB
Non-adjacent Channel Isolation		≥ 45 dB
PDL		≤ 0.30 dB
Return loss		≥ 45 dB
Connector Type		COM, EXP:SC/UPC; Else: LC/UPC
Operating Temperature		-10 °C to +70 °C
Storage Temperature		-40 °C to +85 °C
Relative Humidity		5 % to 95 %
Dimension		1U (483 mm × 250 mm × 44.5 mm)

Note: [1] Within operating temperature and SOP.

[2] Excluding Connectors.(*IL is 0.2 dB higher for connector added.)





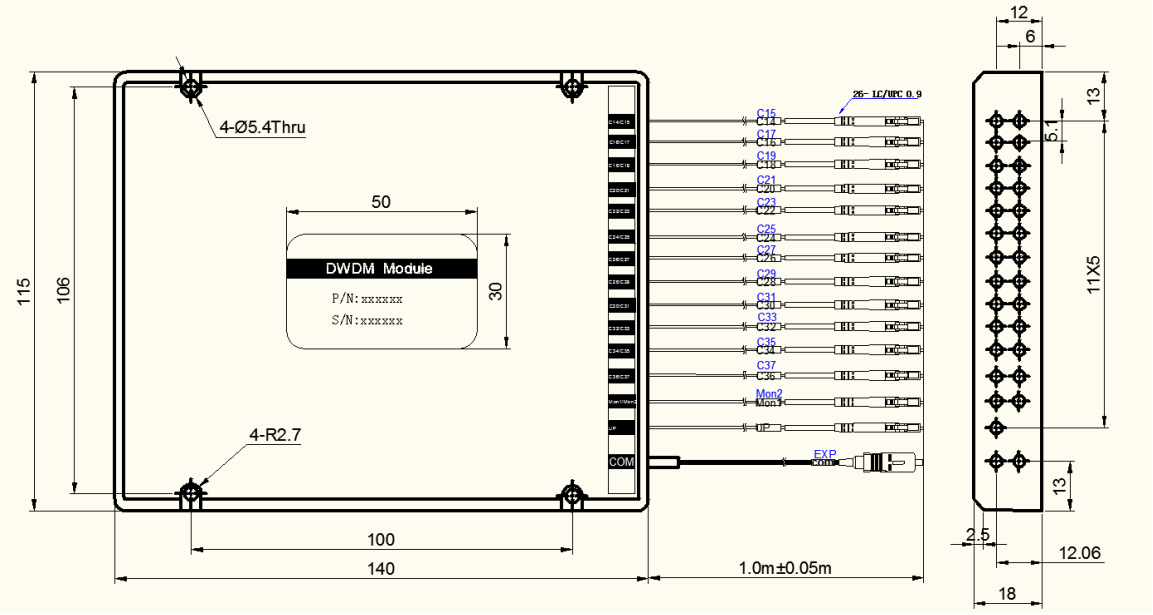
24-wavelength Optical MUX/DEMUX

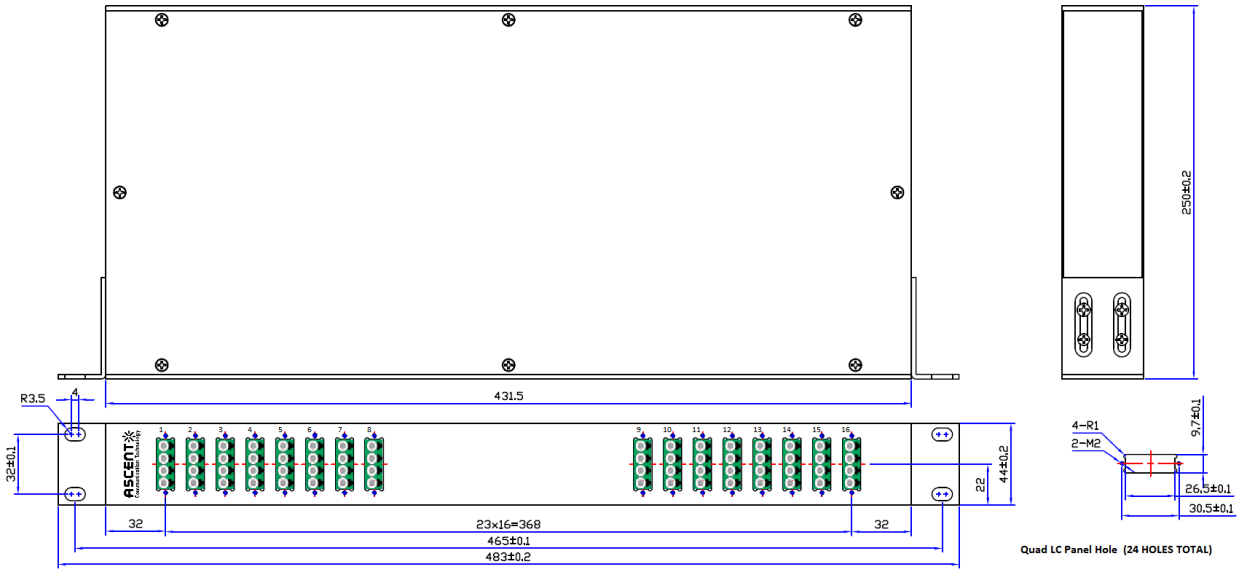
Parameters		AOPD-24-A2-1-14-0-F-C
Wavelength Range		ITU channels 186.6 to 196.1 THz
Channel Center Wavelength		ITU channels
Channel Spacing		100 GHz
Channel Passband (@-0.5dB)		0.22 nm
Channel No.		24 λ
Insertion Loss [1, 2]	Mon2 port	≤ 12 dB
	EXP port	≤ 4.8 dB
	Else port	≤ 10 dB
Adjacent Channel Isolation		≥ 30 dB
Non-adjacent Channel Isolation		≥ 45 dB
PDL		≤ 0.30 dB

Return loss	≥ 45 dB
Connector Type	COM, EXP:SC/UPC; Else: LC/UPC
Operating Temperature	-10 °C to +70 °C
Storage Temperature	-40 °C to +85 °C
Relative Humidity	5 % to 95 %
Dimension	1U (483 mm × 250 mm × 44.5mm)

Note: [1] Within operating temperature and SOP.

[2] Excluding Connectors.(*IL is 0.2 dB higher for connector added.)





Accessories Specifications

ACT Plug-in Optical Attenuators, Patch Cords, Pigtails and Adaptors

Optical Attenuator Specification

Operating Wavelength	1310 nm ± 40 nm and 1550 nm ± 40 nm
Attenuation Level	XX: 01, 02, 03…30 dB in 1 dB step
Attenuation Accuracy	±10%
Optical Connector	AS: SC/APC ; US: SC/UPC; AF: FC/APC or UF: FC/UPC
Model Number	AOP-ATT-XX-YY (XX: Attenuation; YY: Optical Connector)

Optical Patch Cord Specification

Fiber Type	3 mm Single-mode
Fiber Length	02: 2m, 05: 5m , 10: 10m, 30: 30m
Insertion Loss	≤0.5dB
Optical Connector	AS: SC/APC ; US: SC/UPC; AF: FC/APC or UF: FC/UPC
Model Number	AOP-PCD-XX-YY-ZZ (XX, YY: Optical Connector, ZZ: Fiber Length)

Optical Pigtail Specification

Fiber Type	3 mm Single Mode, Connectorized on one end and bare on other
Fiber Length	02: 2m, 05: 5m , 10: 10m, 30: 30m
Insertion Loss	≤0.25dB
Optical Connector	AS: SC/APC; US: SC/UPC; AF: FC/APC or UF: FC/UPC
Model Number	AOP-PGT-XX-ZZ (XX: Optical Connector, ZZ: Fiber Length)

Optical Adaptor Specification

Optical Connector	AS: SC/APC ; US: SC/UPC; AF: FC/APC or UF: FC/UPC
Insertion Loss	Various by connector types
Optical Connector	AS: SC/APC ; US: SC/UPC; AF: FC/APC or UF: FC/UPC
Model Number	AOP-ADP-XX-YY (XX, YY: Optical Connector)

General Specifications

Operating Temp	-40 °C to 85 °C
Storage Temp	-40 °C to 85 °C
Operating relative humidity	5 % to 95 %
Weight	Various by model types

Note: Contact ACT for different packaging options. 8° angle polished for all APC connectors.

Ordering Information

Contact ACT for the complete CWDM/DWDM/WDM/Optical Splitter offerings and other accessories.

Sample Configuration:

AOP-24-U-7-AE-0-9

Coarse Wavelength Division Multiplexer in 19" sub-rack 1RU for 24 x Point to Point (P2P) Active Ethernet lines or EPON/GPON with CATV overlay. SC/APC green angle-polished connectors for CATV and COM Port (CPE Side), SC/PC blue flat-polished connectors for the P2P, PON OLT side.

AOP-32-U-7-AE-0-7

Coarse Wavelength Division Multiplexer in 19" sub-rack 1RU for 32 x Point to Point (P2P) Active Ethernet lines or EPON/GPON with CATV overlay. LC/APC green angle-polished connectors for CATV and COM Port (CPE Side), LC/PC blue flat-polished connectors for the P2P, PON OLT side.

AOP-DCM-85-AS

ACT 1RU Dispersion Compensation Optical Fiber Module (DCM) 85Km, SC/APC Connector

AOS-S Optical Splitters (typical part numbers)

AOS-S-1-2-L-9XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 9XXXXXX, 50/50 SC/APC
AOS-S-1-2-L-0XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 0XXXXXX, 95/05, SC/APC
AOS-S-1-2-L-1XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 1XXXXXX, 90/10, SC/APC
AOS-S-1-2-L-2XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 2XXXXXX, 85/15, SC/APC
AOS-S-1-2-L-3XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 3XXXXXX, 80/20, SC/APC
AOS-S-1-2-L-4XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 4XXXXXX, 75/25, SC/APC
AOS-S-1-2-L-5XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 5XXXXXX, 70/30, SC/APC
AOS-S-1-2-L-6XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 6XXXXXX, 65/35, SC/APC
AOS-S-1-2-L-7XXXXXX-1	Optical Coupler, Standard 1x2, LGX Box, Coupling Ratio = 7XXXXXX, 60/40, SC/APC
AOS-S-1-3-L-6XXX9XX-1	Optical Coupler, Standard 1x3, LGX Box, Coupling Ratio = 6XXX9XX, 34/33/33, SC/APC
AOS-S-1-4-L-B000000-1	Optical Coupler LGX Box 1x4 even balanced SC/APC
AOS-S-1-5-L-B000000-1	Optical Coupler LGX Box 1x5 even balanced SC/APC
AOS-S-1-6-L-B000000-1	Optical Coupler LGX Box 1x6 even balanced SC/APC
AOS-S-1-16-F-B000000-1	Optical Coupler FLAT Box 1x16 Bare Fiber even balanced SC/APC
AOS-S-1-32-F-B000000-1	Optical Coupler FLAT Box 1x32 Bare Fiber even balanced SC/APC
AOS-S-1-64-F-B000000-1	Optical Coupler FLAT Box 1x64 Bare Fiber even balanced SC/APC

AOP-LGX-CH-1RU	AOP Optical LGX Chassis 1RU, 19 inches wide, 6 standard LGX slots

AOPD-08-A6-1-14-0-F-C	Optical MUX/DEMUX; DWDM 100G, 8-wavelength with LC express channel, SCA for COM and EXP ports. 90:10 2x2 coupler with LC Tx MON and Rx MON ports. 6 units combo into a single 1 RU chassis. Starting wavelength C14 , Corning G657A.1 Fiber
AOPD-12-A4-1-14-0-F-C	Optical MUX/DEMUX; DWDM 100G, 12-wavelength with LC express channel, SCA for COM and EXP ports. 90:10 2x2 coupler with LC Tx MON and Rx MON ports. 4 units combo into a single 1 RU chassis. Starting wavelength C14 , Corning G657A.1 Fiber
AOPD-24-A2-1-14-0-F-C	Optical MUX/DEMUX; DWDM 100G, 24-wavelength with LC express channel, SCA for COM and EXP ports. 90:10 2x2 coupler with LC Tx MON and Rx MON ports. 2 units combo into a single 1 RU chassis. Starting wavelength C14 , Corning G657A.1 Fiber

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