

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)

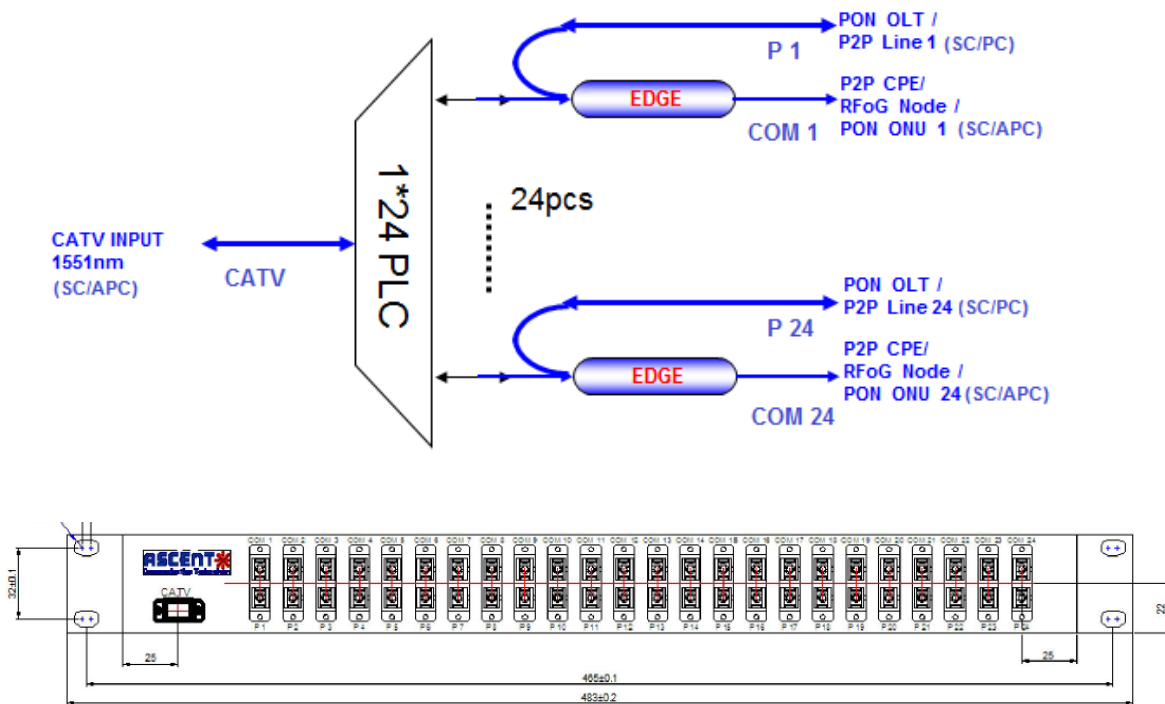


Figure 1. Coarse wavelength division multiplexer for 1551 nm CATV overlay in P2P Active Ethernet applications. 24-port CATV RF overlay splitter with 24 x P2P Active Ethernet ports.

CWDM Specifications

ACT Optical Passives CWDM, (AOPC)

Optical Specification

Centre wavelength	1260 nm to 1360 & 1480 to 1611 nm
Channel spacing	20 nm
Channels	2, 4, 6, 8, 10 or 12
Channel pass band	CW±7.5nm
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	≥ 40 dB
Directivity	≥ 50 dB
Return loss	≥ 45 dB

General Specifications

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



DWDM Specifications

ACT Optical Passives DWDM (AOPD)

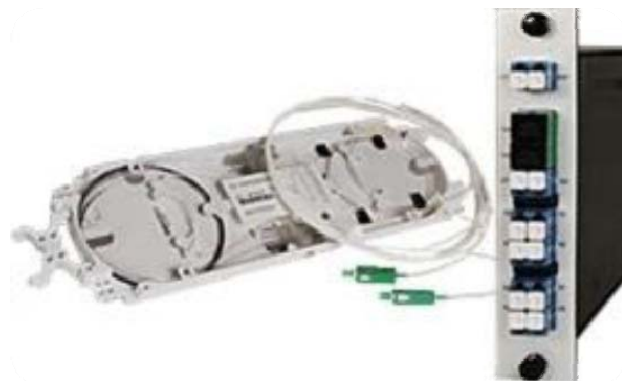
Optical Specification

Centre wavelength	1520 to 1580nm
Channel spacing	100 or 200GHz
Channels	2, 4, 6, 8, 10 or 12
Channel pass band	ITU ± 0.25 nm
Pass band flatness	$\leq \pm 0.5$ 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	≥ 40 dB
Directivity	≥ 45 dB
Return loss	≥ 45 dB

General Specifications

Operating Temp, °C	-40 to 85
Storage Temp, °C	-40 to 85
Operating relative humidity, %	5 to 95
Dimensions (W x D x H)	Various by model LGX : industry standard Flat Box: 100x80x10.5 mm (≤ 8 output ports), or 140x115x18 mm (> 8 output ports)
Weight, kg	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	
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	

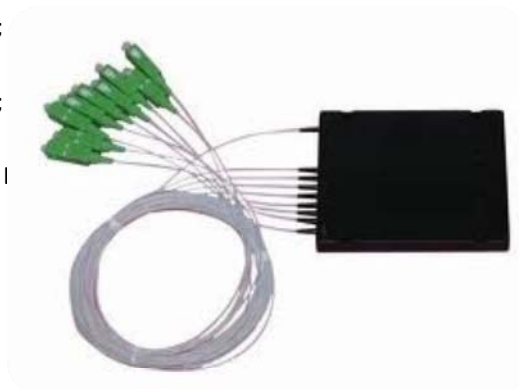
Table 1: Reference ITU DWDM Chart

Optical Splitters Specifications

ACT Optical Passives Optical Splitters (AOS)

Optical Specification

Centre wavelength	1260 nm to 1350 & 1460 to 1620 nm
Configuration	1x2, 1x3, 1x4, 1x8, 1x16, 1x24, 1x32
Channel pass band	≥ 14 nm
Insertion Loss 1 ch to 4 ch	Various See below chart
Insertion Loss 1x8 Coupler	10.5dB
Insertion Loss 1x12 Coupler	12.5dB
Insertion Loss 1x24 Coupler	17dB
Insertion Loss 1x32 Coupler	18dB
Uniformity (dB)	≤1.2 (1x4); ≤1.8 (1x8);
Directivity	≥ 50 dB
Polarization Dependent Loss	≤0.2 (1x4); ≤0.3 (1x8);
Return loss	≥ 50 dB
Connectors	SC/APC, SC/PC, LC/APC, I
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(≤8 output ports), 140×115×18 mm (>8 output ports)
Weight, kg	Weight varies depending on model.



Split ratio	Maximum Insertion Loss dB
50/50	3.6/3.6
55/45	3.1/4.2
60/40	2.7/4.7
65/35	2.3/5.3
70/30	1.9/6.0
75/25	1.7/6.95
80/20	1.4/7.9
85/15	1.0/9.6
90/10	0.7/11
95/05	0.5/14.5
97/03	0.35/17.5
80/10/10	1.3/11.4/11.4
70/15/15	2/9.7/9.7
60/20/20	2.8/8/8
50/25/25	3.7/7.1/7.1
40/30/30	4.8/6.1/6.1
33/33/33	5.8/5.8/5.8
30/35/35	6.1/5.5/5.5
25/25/25/25	7.6

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

PON, RFoG Passives Specifications

ACT Special HFC, FTTH, PON, RFoG Triple Play Optical Passive

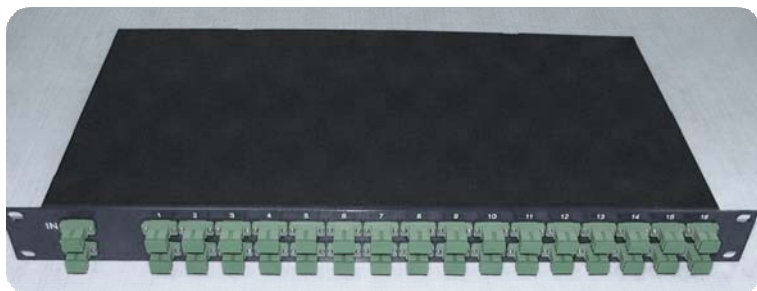
Optical Specification

Centre wavelength	1260 nm to 1360 & 1480 to 1620 nm
CATV Band	1540 nm to 1560nm
Channel spacing	20 nm
Channels	1, 2, 4, 6, 8, 12, 24 or 32
Channel pass band	≥ 14 nm
Pass band Ripple	≤ 0.5 dB
RF bandwidth:	47~1003 MHz
Insertion Loss 1 ch	0.8 dB
Insertion Loss 4 ch	1.4 dB to 1.6 dB
Insertion Loss 8 ch	1.8 dB to 2.5 dB
Insertion Loss 1x24 Coupler	16.7dB (CATV - COM), 0.8 (COM – PON)
Insertion Loss 1x32 Coupler	18dB
Adjacent channel isolation	≥ 35 dB (CATV – COM)
Directivity	≥ 50 dB
Return loss	≥ 45 dB

General Specifications

Operating Temp, °C	-10 to 70
Storage Temp, °C	-40 to 85
Power Supply	90 to 265 VAC or 30 to 72 VDC
Operating relative humidity, %	5 to 95
Dimensions (W x D x H)	1RU : 470x225x44 mm,19x9x1.75 inch
Weight, kg	6 kg (1RU)
Ship weight	8 kg (1RU)

*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)*



DCM Specifications

ACT 1RU Dispersion Compensation Optical Fiber Module (DCM)

Dispersion is a fiber character that causes light pulses to spread. In digital transport systems, Dispersion limits both the link’s bit-rate and the maximum transmission distance that can be achieved through fiber. ACT Dispersion Compensation Module (DCM) contains passive fiber optics designed to reverse the effects of dispersion in order to correct the transmitted pulse shape.

In analog transmission system, dispersion also limits the maximum transmission distance by increasing the magnitude of second order impairments (CSO) to the signal. ACT Dispersion Compensation Module is designed to reverse the effects of dispersion, reduce the magnitude of the CSO impairment, and restore the ability to transmit over greater distances.

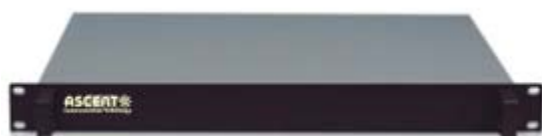
Optical Specification

Optical wavelength	1525 nm to 1565nm
Fiber	G.652 standard single mode fiber (SMF-28)
Pass Power	30dBm
Dispersion @1550nm ps/nm	20km: -330 ; 40km: -660 ; 60km: -980 ; 85km: -1500 ; (Typical)
Insertion Loss (MAX)	20km: 2.7; 40km: 4.1 ; 60km: 5.5 ; 85km: 7.3dB;
Polarization Mode Dispersion (MAX)	20km: 0.4; 40km: 0.5 ; 60km: 0.6 ; 85km: 0.7ps;
Dispersion Fiber Length (MAX)	20km: 2.4; 40km: 4.8 ; 60km: 7.2 ; 85km: 10.2dB;
Residual dispersion slope	0.00360(nm-1) (typical)
Fiber Connector	SC/APC

General Specifications

Operating Temp, °C	-5 to 70
Storage Temp, °C	-40 to 85
Operating relative humidity, %	0 to 85
Dimensions (W x D x H)	1RU : 483x279x44 mm,19x11x1.75 inch
Weight, kg	3 kg (1RU)

*Note: Contact ACT for longer distance upto 120km. Weight will vary depending on model.
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	1.5mm thick cold-rolled sheet
Capacity	Up to 72 interconnectors or patches, 12 LGX modules (4RU)
Dimensions (WxHxD)	With mounting bracket 483x177x305 mm (4RU) With mounting bracket 483x44x320 mm (1RU)
Model Number	AOP-LGX-CH (4RU), AOP-LGX-CH-1RU (1RU up to 6 LGX Module),

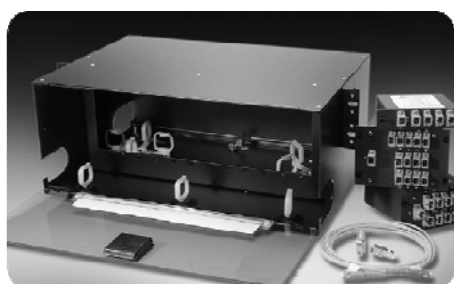
Optical Distribution Frame Specification

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

General Specifications

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

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



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 ~ 144	240
Core Capacity per Tray	24	12, 24, 48
Cable Ports	9	6
Cable Diameter (max)	Φ38mm	Φ17mm
Dimensions (DxH)	φ 470×210mm	Φ220×480mm
Model Number	AOP-HSE-9-xx (xx: splices)	AOP-MSE-6-xx (xx: splices)

General Specifications

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

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



Accessories Specifications

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

Optical Attenuator Specification

Operating wavelength	1310nm +/-40nm & 1550nm +/-40nm
Attenuation Level	XX: 01, 02, 03...30dB 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	3mm 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	3mm 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, °C	-40 to 85
Storage Temp, °C	-40 to 85
Operating relative humidity, %	5 to 95
Weight, kg	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

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