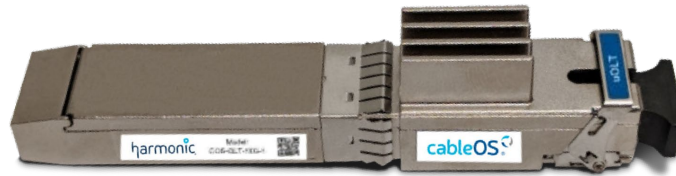


# CableOS® Fin-1SFP+ based OLT



The Harmonic CableOS® Fin-1 is a 10G/10G Optical Line Terminal (OLT) in an SFP+ compliant package supporting XGS-PON or 10G-EPON protocols from a node or switch.

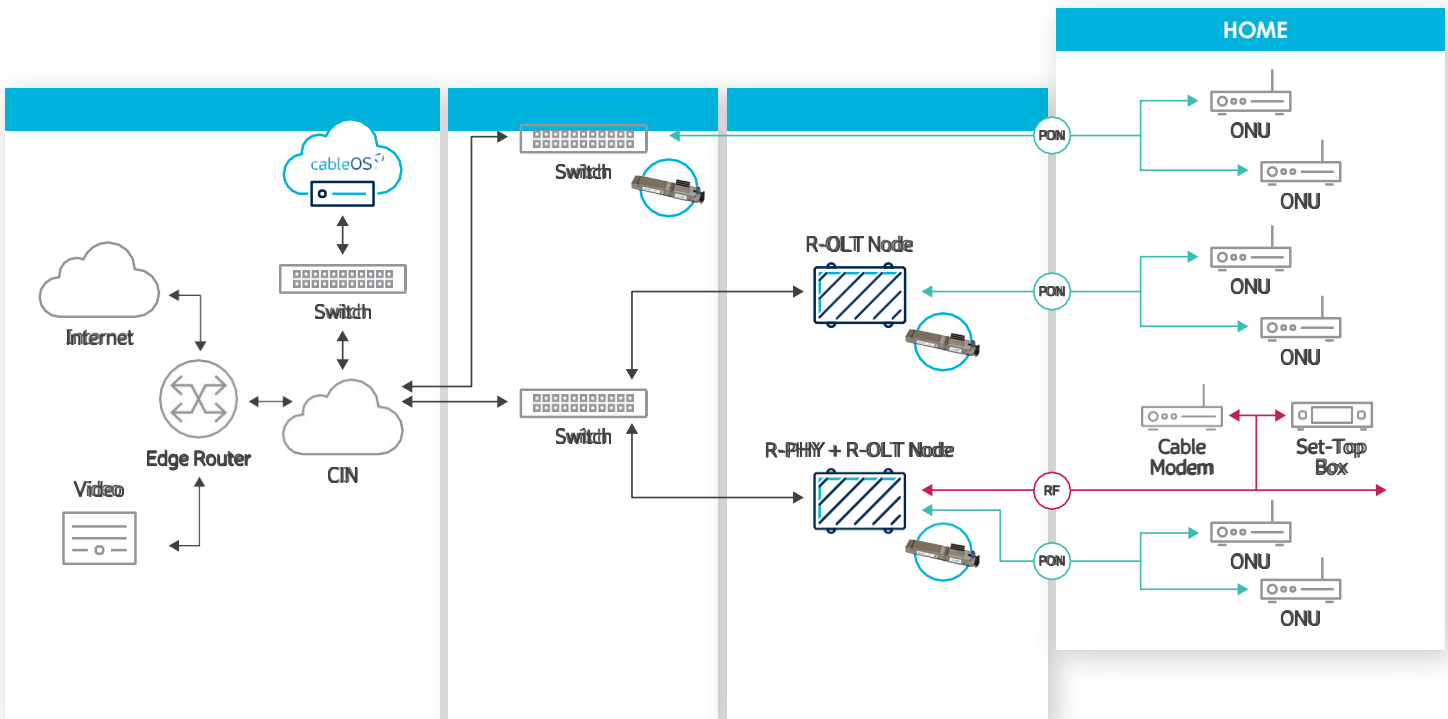
Driven by Harmonic's Cloud-Native virtual OLT controller, Fin-1 enables simple plug-and-play 10G PON capability from a Harmonic node or Ethernet switch by using two available models. The high optical power budget model (PR30) is dedicated for deployment within Ethernet switches in headends, hubs or MDU's basements. The industrial temperature model (PR10+) is designed for outdoor nodes supporting PR10+ optical power levels. Based on subscriber service provisioning, the Fin-1 provides 10G subscriber service to a wide-range of third party ITU-T G.9807 or IEEE 802.3av 10G ONUs.

Harmonic's Pebble-1 Remote PHY Device (RPD) coupled with the Fin-1 Remote OLT (R-OLT) provides simultaneous services to subscribers connected to DOCSIS Cable Modems and PON Optical Network Units (ONU). Harmonic's hardened Ripple-1 strand mount and Shell-1 wall mount nodes provide a perfect home for extending access networks with 10G symmetric PON.

With Harmonic's CableOS Cloud-Native PON and DOCSIS solution operators can deliver multigigabit and symmetric operation over mixed HFC and FTTH access networks. Harmonic's CableOS Cloud-Native is a virtual CMTS, virtual OLT, and optional virtual BNG, running on commercial off the shelf x86 server. The Fin-1 seamlessly operate with CableOS Cloud-Native.

## APPLICATIONS

- OLT or R-OLT for 10G/10G PON from Central Office, Hub or Remote node
- High-bandwidth enterprise PON connectivity
- Residential, Enterprise and Wireless xHaul PON access
- Mixed HFC/FTTH access network



## FIN-1 NETWORKING AND OPERATION

Feature	Modes of Operation	
	XGS-PON	10G-EPON
PON Protocols	ITU-T G.9807.1	IEEE802.3av
Resources	500 XGEMs and T-CONTs	1000 LLIDs
Jumbo frames	9.6KB	12.5KB
Security	IEEE AES encryption on PON side, IEEE802.1ae MACsec uplink encryption	
Management	Inband over IEEE 1904.2	
Digital Diagnostics and Monitoring	SFF-8472	

## ORDERING INFORMATION

Part Number	Product Description
COS-FIN1-10-I-E1	10G/10G SFP+ based OLT, PR10+ optical power budget with extended receiver sensitivity, Industrial temperature range for outdoor/indoor operation from node and Ethernet switch
COS-FIN1-10-I-H0	10G/10G SFP+ based OLT, PR10+ optical power budget, Industrial temperature range for outdoor/indoor operation from node and Ethernet switch
COS-FIN1-30-E-H0	10G/10G SFP+ based OLT, PR30 optical power budget, Extended temperature range for indoor operation from Ethernet switch

## SPECIFICATION FOR PR10+ I-TEMP UNITS (COS-FIN1-10-I-E1 AND COS-FIN1-10-I-H0)

## TRANSMITTER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min	Typical	Max	Unit	Condition
Laser Type	–	CW cooled DML DFB			–	–
Maximum Reach	–	≥10km			–	
Nominal Line Rate	BW <sub>TX</sub>	–	9.95328	–	Gb/s	XGS mode
		–	10.3125	–		EPON mode
Operating Wavelength	A <sub>c</sub>	1575	1577	1580	nm	
Spectral Width	A <sub>c</sub>	–	–	1	nm	
Average Launch Power	P <sub>o</sub>	3.0	–	6.0	dBm	
Extinction Ratio	ER	6.0	–	–	dB	
Transmitter Tolerance to Reflected Optical Power	T <sub>t</sub>	-15	–	–	dB	
Side Mode Suppression Ratio	SMSR	30	–	–	dB	

## RECEIVER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min	Typical	Max	Unit	Condition
Receiver Type	–	Burst mode APD/TIA			–	–
Nominal Line Rate	BW <sub>RX</sub>	–	9.95328	–	Gb/s	XGS mode
		–	10.3125	–		EPON mode
Operating Wavelength	A <sub>c</sub>	1260	1270	1280	nm	
Damage Threshold	P <sub>D</sub>	–	–	-4	dBm	
Sensitivity for COS-FIN1-10-I-E1	P <sub>SEN</sub>	-5	–	-28	dBm	9.95328..10.3125Gb/s, A <sub>c</sub> =1270nm, NRZ, ER=6dB, BER<10 <sup>-3</sup> , PRBS 2 <sup>31</sup> -1
Sensitivity for COS-FIN1-10-I-H0	P <sub>SEN</sub>	-5	–	-26	dBm	9.95328..10.3125Gb/s, A <sub>c</sub> =1270nm, NRZ, ER=6dB, BER<10 <sup>-3</sup> , PRBS 2 <sup>31</sup> -1
Consecutive Identical Digit Immunity	CID	72	–	–	bits	
Receiver Reflectance	R A <sub>c</sub>	–	–	-12	dB	@ 1260..1280nm

# CableOS® Fin-1SFP+ based OLT

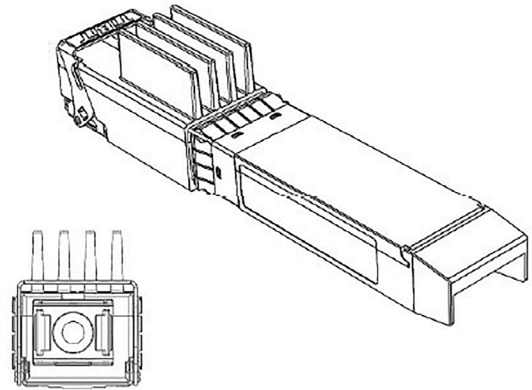
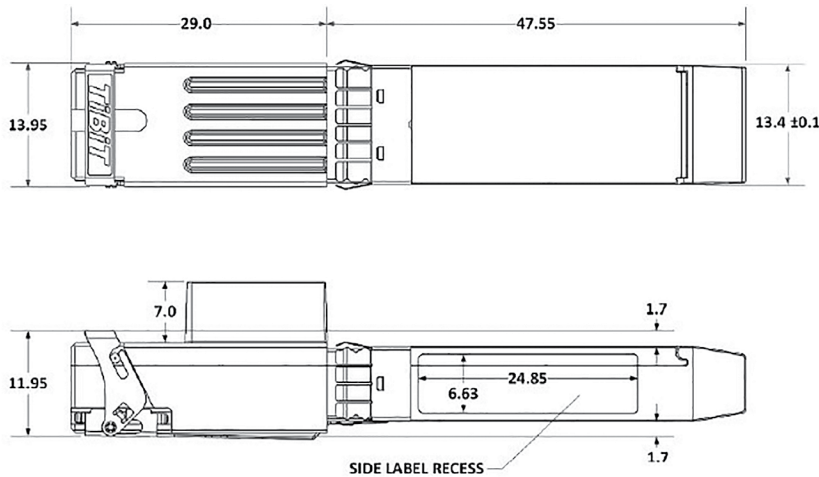
## POWER CONSUMPTION

Parameter	Symbol	Min	Typical	Max	Unit
Module Power Consumption	PDISS	-	2.2	2.8	W

## ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	$T_s$	-40	85	°C	—
Operating Case Temperature	$T_c$	-40	85	°C	Industrial Temperature
Relative Humidity – Storage	$RH_s$	0	95	%	Non condensing
Relative Humidity – Operating	$RH_o$	5	80	%	Non condensing

## MECHANICAL SPECIFICATION



Parameter	Description
Optical port	SC/UTC

## SPECIFICATION FOR PR30 E-TEMP UNIT (COS-FIN1-30-E-H0)

### TRANSMITTER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min	Typical	Max	Unit	Condition
Laser Type	—	CW cooled EML DFB			—	—
Maximum Reach	—	$\geq 20$			Km	Note 1
Nominal Line Rate	$BW_{TX}$	—	9.95328	—	Gb/s	XGS mode
		—	10.3125	—		EPON mode
Operating Wavelength	$c$	1575	1577	1580	nm	
Spectral Width	$c$	—	—	1	nm	
Average Launch Power	$P_o$	4.0	—	7.0	dBm	
Extinction Ratio	ER	8.2	—	—	dB	
Transmitter Tolerance to Reflected Optical Power	$T_t$	-15	—	—	dB	
Side Mode Suppression Ratio	SMSR	30	—	—	dB	

**RECEIVER OPTICAL CHARACTERISTICS**

Parameter	Symbol	Min	Typical	Max	Unit	Condition
Receiver Type	–	Burst mode APD/TIA			–	–
Nominal Line Rate	BW <sub>RX</sub>	–	9.95328 10.3125	–	Gb/s	XGS mode EPON mode
Operating Wavelength	$\lambda_c$	1260	1270	1280	nm	
Damage Threshold	P <sub>D</sub>	–	–	-6	dBm	
Sensitivity	P <sub>SEN</sub>	-7	–	-28	dBm	9.95328..10.3125Gb/s, $\lambda_c$ = 1270nm, NRZ, ER=6dB, BER<10 <sup>-3</sup> , PRBS 2 <sup>31</sup> -1
Consecutive Identical Digit Immunity	CID	72	–	–	bits	
Receiver Reflectance	R <sub>c</sub>	–	–	-12	dB	@ 1260..1280nm

**POWER CONSUMPTION**

Parameter	Symbol	Min	Typical	Max	Unit
Module Supply Current	I <sub>CC</sub>	-	750	1000	mA
Module Power Consumption	PDISS	-	2.475	3.3	W

**RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	Min	Typical	Max	Unit
Case Operating Temperature	T <sub>c</sub>	-20	-	75	°C

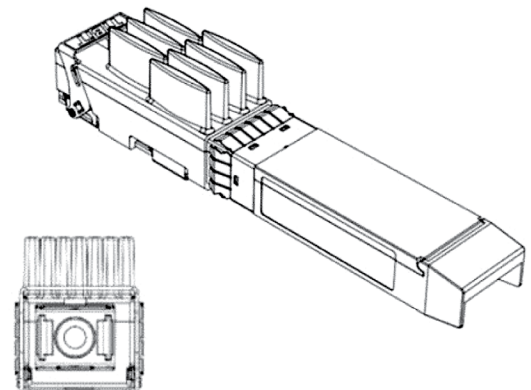
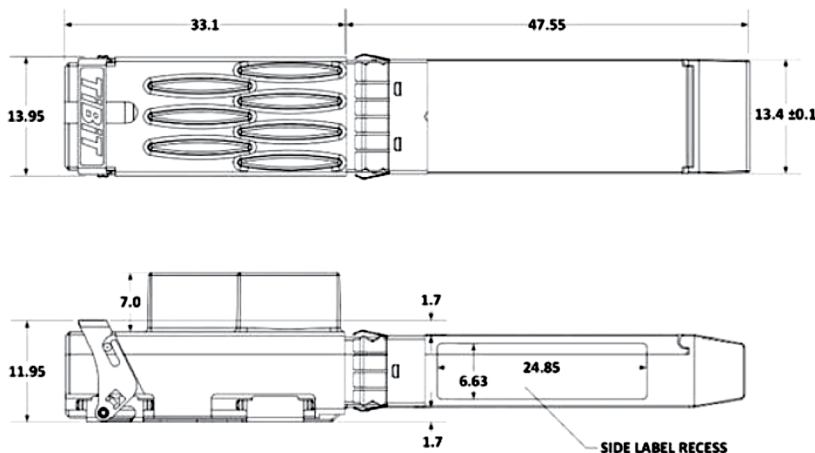
Notes:

1. When ambient temperature is above 40°C, airflow at a rate higher than 1m/sec is required.
2. Module supports "cold-start" at -40°C.

**ABSOLUTE MAXIMUM RATING**

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	T <sub>s</sub>	-40	85	°C	–
Operating Case Temperature	T <sub>c</sub>	-20	75	°C	–
Relative Humidity – Storage	RH <sub>s</sub>	0	95	%	Non condensing
Relative Humidity – Operating	RH <sub>o</sub>	5	80	%	Non condensing

**MECHANICAL SPECIFICATION**



Parameter	Description
Optical port	SC/UTC