

C-band QSFP-EDFA

Plug and Play EDFA Series



QOA

(QSFP-Optical Amplifier)

QSFP Compatible EDFA

The world first plug and play QSFP-EDFA, QOA is a full-functioning EDFA module with control circuitry packaged inside. It is totally compatible with conventional QSFP optical transceiver in respect of size and pin-map. Due to the small size and easy installation, the QOA is designed for amplification of optical signals at C-band in fiber optic communications system in 5G network, high speed datacenter, core networks, SDN and CATV networks. The QOA provides very stable output power up to 19 dBm and noise figure of 6 dB in C-band over wide operating temperature range. Ultra compact size (18.4 x 78 x 8.5 mm), combined with extremely low power consumption, allows the QOA to be highly suitable for applications of power equalization or pre-emphasis in densely packaged telecom systems, especially for densely integrated high speed transmitter or receiver card.

Features

- Conventional QSFP compatible size and pin map
- Cost efficiency with pluggable type
- Space efficiency using remaining slot (No extra equipment required)
- EDFA module including micro process control circuit
- Uncooled 980 nm pump laser module
- Extremely lower the heat generation
- High saturation output power up to 19dBm
- Selectable output power
- Wide input dynamic range
- Significantly low power consumption
- Control & monitoring by I2C
- LVTTTL Alarm
- Single + 3.3 V power supply

Applications

- 5G network & ROADM system
- Power boosting and pre-emphasis optical amplifier for DWDM metro system
- High speed data center network
- 100G or higher speed channel optical amplifier
- Reach extension for L2/L3 ethernet switch
- RF over Fiber Network
- Signal loss compensation in switch matrix
- SONET/SDH system
- OADM access networks
- CATV System



Optical Fiber Amplifier

C-band QOA (QSFP Optical Amplifier)

Optical Characteristics : Single Channel

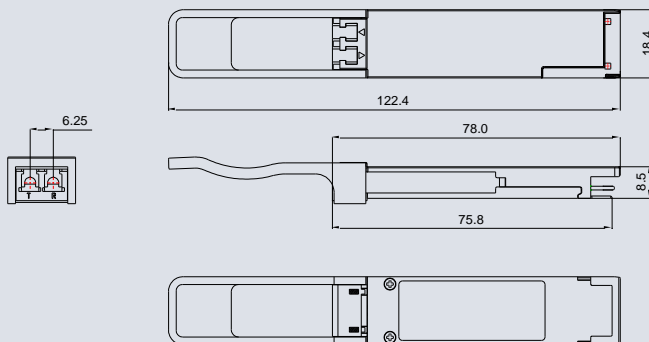
Parameter	Symbol	Booster Specification			Pre-Amp. Specification			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Signal wavelength range	λ	1527.99	-	1568.36	1527.99	-	1568.36	nm
Input power	P_{IN}	-20	-	5	-25	-	-5	dBm
Saturation output power	P_{OUT}	-	19 ⁽¹⁾	-	-	10 ⁽²⁾	-	dBm
Noise figure	NF	-	6	7	-	6.5	7.5	dB
Optical isolation	ISO	20	-	-	20	-	-	dB
Return loss	RL	40	-	-	40	-	-	dB
Polarization mode dispersion	PMD	-	-	0.5	-	-	0.5	ps
Polarization dependent gain	PDG	-	-	0.5	-	-	0.5	dB
Control scheme	-	APC			APC			-

(1) Input power = 0 dBm, set gain = 19dB, full wavelength range

(2) Input power = -10 dBm, set gain = 20dB, full wavelength range

Mechanical Dimension

(WxLxH = 18.4 X 78 X 8.5 [mm])



Electric & Environmental Characteristics

Parameter	Specification
Power supply voltage	+3.3 V
Interface	I2C
Alarm	LVTTTL
Operating case temperature	-5 ~ 75 °C
Storage temperature	-40 ~ 85 °C
Storage humidity	5 ~ 85 % R.H
Power consumption*	2.4 W

* in max. input power and full temperature range

* The cage with heatsink is recommended for normal operation.

Control and Monitoring Functions

Parameter	Specification
Control scheme	APC with FLS
Monitor	IPM / OPM / LD-Bias / Case-Temp
Alarm	LOS / LOP / LD-Bias / Gain

* FLS: Forced Laser Shutdown

Ordering Information (Ex. : OFA-TCQ-19AP, TDM C-band QSFP-type 19dBm output power EDFA with APC)

O	F	A	-	T	C	X	-	19AP	-	F15 *
	F : EDFA			T : TDM	C : C-band	F : SFP+ -EDFA		19AP : 19dBm Pout		G : without GFF
				C : CATV	L : L-band	Q : QSFP-EDFA		14AP : 14dBm Pout		F : with GFF
				W : DWDM		X : XFP-EDFA		10AG : 10dBm Pout		
								05AG : 5dBm Pout		15 : Gain 15dB
								AP : Automatic Power Control		
								AG : Automatic Gain Control		* Only available for AGC
								SG : Settable Gain Control		

※ Single Channel Standard Product : **BST_OFA-TCQ-17AP, PRE_OFA-TCQ-10AP**

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Optical Fiber Amplifier

C-band QOA (QSFP Optical Amplifier)

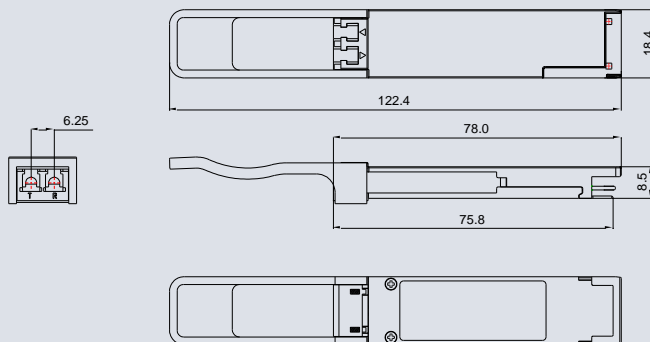
Optical Characteristics : Multi Channel **without GFF**

Parameter	Symbol	Booster Specification			Pre-Amp. Specification			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Signal wavelength range	λ	1527.99	-	1568.36	1527.99	-	1568.36	nm
Input power	P_{IN}	-20	-	5	-25	-	-5	dBm
Saturation output power	P_{OUT}	-	19 ⁽¹⁾	-	-	10 ⁽²⁾	-	dBm
Gain	G	-	15 ⁽¹⁾	-	-	20 ⁽²⁾	-	dB
Gain setting range ⁽³⁾	-	10	15	20	15	20	23	dB
Gain flatness	G_{FLAT}	-	5.5	6.5	-	5.5	6.5	dB
Noise figure	NF	-	6	7	-	6.5	7.5	dB
Transient Performance ⁽⁴⁾	TR	-	-	-	-	-	-	-
① Excursion Tr/Tf = 100us, 12dB Add/Drop	-	-3	-	4	-3	-	4	dB
② Gain offset	-	-3.3	-	3.3	-3.3	-	3.3	dB
③ Settling time	-	-	-	500	-	-	500	ms
Optical isolation	ISO	20	-	-	20	-	-	dB
Return loss	RL	40	-	-	40	-	-	dB
Polarization mode dispersion	PMD	-	-	0.5	-	-	0.5	ps
Polarization dependent gain	PDG	-	-	0.5	-	-	0.5	dB
Control scheme	-	AGC			AGC			-

- (1) Input power = +4 dBm, set gain = 15dB, full wavelength range
 (2) Input power = -10 dBm, set gain = 20dB, full wavelength range
 (3) The gain setting is a function the only works for SGC models.
 (4) at Typical gain. Excursion corresponds to Net Gain overshoot / undershoot.

Mechanical Dimension

(WxLxH = 18.4 X 78 X 8.5 [mm])



Electric & Environmental Characteristics

Parameter	Specification
Power supply voltage	+3.3 V
Interface	I2C
Alarm	LVTTL
Operating case temperature	-5 ~ 75 °C
Storage temperature	-40 ~ 85 °C
Storage humidity	5 ~ 85 % R.H
Power consumption*	2.4 W

* in max. input power and full temperature range

* The cage with heatsink is recommended for normal operation.

Control and Monitoring Functions

Parameter	Specification
Control scheme	AGC with FLS
Monitor	IPM / OPM / LD-Bias / Case-Temp
Alarm	LOS / LOP / LD-Bias / Gain

* FLS: Forced Laser Shutdown

Ordering Information (Ex.: OFA-WCQ-19AG-G15, WDM C-band QSFP-type 19dBm output power & 15dB gain EDFA without GFF)

O	F	A	-	T	C	X	-	19AP	-	F15 *
	F : EDFA			T : TDM	C : C-band	F : SFP+ -EDFA		19AP : 19dBm Pout		G : without GFF
				C : CATV	L : L-band	Q : QSFP-EDFA		14AP : 14dBm Pout		F : with GFF
				W : DWDM		X : XFP-EDFA		10AG : 10dBm Pout		
								05AG : 5dBm Pout		15 : Gain 15dB
								AP : Automatic Power Control		
								AG : Automatic Gain Control		* Only available for AGC
								SG : Settable Gain Control		

※ Multi Channel Standard Product without GFF : **BST_OFA-WCQ-17AG-G15, PRE_OFA-WCQ-10AG-G20**

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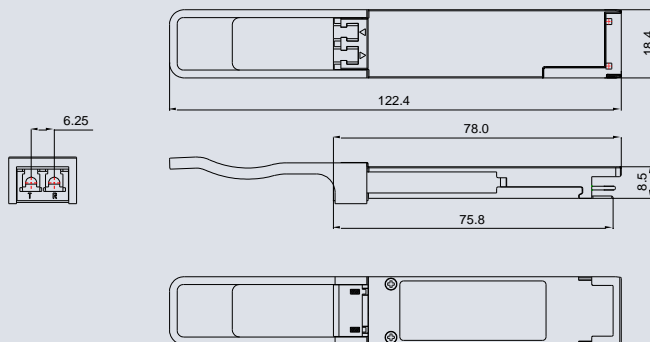
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Input power	P_{IN}	-20	-	5	-25	-	-5	dBm
Saturation output power	P_{OUT}	-	16 ⁽¹⁾	-	-	10 ⁽²⁾	-	dBm
Gain	G	-	15 ⁽¹⁾	-	-	20 ⁽²⁾	-	dB
Gain setting range ⁽³⁾	-	10	15	20	15	20	23	dB
Gain flatness	G_{FLAT}	-	1	2	-	1	2	dB
Noise figure	NF	-	6	7	-	6.5	7.5	dB
Transient Performance ⁽⁴⁾	TR							
① Excursion Tr/Tf = 100us, 12dB Add/Drop	-	-3	-	4	-3	-	4	dB
② Gain offset	-	-1	-	1	-1	-	1	dB
③ Settling time	-	-	-	500	-	-	500	ms
Optical isolation	ISO	20	-	-	20	-	-	dB
Return loss	RL	40	-	-	40	-	-	dB
Polarization mode dispersion	PMD	-	-	0.5	-	-	0.5	Ps
Polarization dependent gain	PDG	-	-	0.5	-	-	0.5	dB
Control scheme	-	AGC			AGC			-

- (1) Input power = +1 dBm, set gain = 15dB, full wavelength range
 (2) Input power = -10 dBm, set gain = 20dB, full wavelength range
 (3) The gain setting is a function the only works for SGC models.
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Control scheme	AGC with FLS
Monitor	IPM / OPM / LD-Bias / Case-Temp
Alarm	LOS / LOP / LD-Bias / Gain

* FLS: Forced Laser Shutdown

Ordering Information (Ex.: OFA-WCQ-16AG-F15, WDM C-band QSFP-type 16dBm output power & 15dB gain EDFA with GFF)

O	F	A	-	T	C	X	-	19AP	-	F15 *
	F : EDFA			T : TDM	C : C-band	F : SFP+ -EDFA		19AP : 19dBm Pout		G : without GFF
				C : CATV	L : L-band	Q : QSFP-EDFA		14AP : 14dBm Pout		F : with GFF
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								AP : Automatic Power Control		
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※ Multi Channel Standard Product with GFF : BST_OFA-WCQ-14AG-F15, PRE_OFA-WCQ-10AG-F20

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