



ALMA
Atacama Large Millimeter Array

Hardware Definition

Optical Fibre Amplifier module

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Optical Fibre Amplifier Module

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1 OVERVIEW

1.1 General Description of Assembly/Module

The optical fibre amplifier module (OFA) is an erbium doped fibre amplifier inserted between the end of the fibre link and the optical demultiplexer switch module (ODSM). One OFA per telescope will be required. It will boost the multiplexed optical signals before they enter the demultiplexer and maintain adequate signal to noise ratio at the optical receiver.

The output from the OFA will be at hazardous levels and access to the EDFA modules will be restricted. In the event of a break in the fibre between the OFA and the ODSM the receiver boards will register a loss of signal alarm and the OFA will be shutdown. This automatic shutdown procedure will take a maximum of 3s.

1.2 Sub-assembly A (optional)

A control card will interface a number of amplifiers to the M&C bus and to the optical receiver modules. The number of amplifiers controlled by one card will depend on the complexity of the interface to the EDFA. Ideally there would be one card per crate controlling eight amplifiers

1.3 Sub-assembly B (optional)

2 INTERFACES

List assembly/modules, and their document numbers, which interface to this hardware device.

- Fibre
- ODSM
- ALMA Monitor and Control Bus
- Optical Receivers

3 SPECIFICATIONS

3.1 Performance Specifications

3.1.1 General description

The OFA comes as a prepackaged EDFA unit with integrated pump lasers and a standard DB-25 electrical connector for control and monitoring.

It is anticipated that 8 of these modules will be packaged inside a housing for rack mounting.

3.1.1.1 Inputs

- Single Fibre
- Operates in the 1530-1560nm range
- 5V power supply

3.1.1.2 Outputs

- Single Fibre
- Maximum output +17dBm

3.1.1.3 Performance

- Small Signal Gain minimum 20dB
- Noise Figure maximum 6dB
- Gain Flatness maximum 2dB over the operating band

3.1.2 Sub-assembly A (optional)

3.1.2.1 Inputs

M&C bus. (CAN)

Keep alive lines (RS422)

3.1.2.2 Outputs

EDFA shutdown signals

3.1.3 Sub-assembly B (optional)

3.1.3.1 Inputs

3.1.3.2 Outputs

3.2 Monitor/Control Interface

3.2.1 General

The control card will contain a standard AMBSI module to convert the CAN bus to one or two SPI buses. And one or two PIC microcontrollers to convert the SPI bus to a number of EDFA specific interfaces

3.2.2 Summary of Monitor Points

3.2.3 Summary of Control Points

3.2.4 Monitor Points in Detail

List monitor function, word, bit and timing definitions.

3.2.5 Control Points in Detail

List monitor function, word, bit and timing definitions.

3.3 Physical Specifications

3.3.1 Packaging

3.3.1.1 General

The OFA modules will be purchased in 'cassette' format and a typical size is 205 x 125 x 20.3 mm.

3.3.1.2 Connectors

DB-25 Connector and RS232 protocol communications

3.3.1.3 Back panel (optional)

The OFA modules and the control card will plug into a printed backplane which will carry control signals and power.

3.3.1.4 Front panel (optional)

3.3.1.5 Sub-assembly A (optional)

DB-15 CAN bus connector

DB-9 Keep alive connector

3.3.1.6 Sub-assembly B (optional)

3.3.2 Power Dissipation and Thermal Interface

3.3.3 Weight

4 FUNCTIONAL DESCRIPTION AND BLOCK DIAGRAMS

4.1 General

Define hot swap requirements, if any.

4.2 Sub-assembly A (optional)

4.3 Sub-assembly B (optional)

5 SETUP AND MAINTENANCE

6 REFERENCES

6.1 ALMA Documents

6.2 ALMA Drawings

6.3 Other References

7 DRAWINGS

8 PHOTOS

9 DATA SHEETS FOR KEY COMPONENTS