



ALMA
Atacama Large Millimeter Array

Hardware Definition

Optical Multiplexer & Monitor Module

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Optical Multiplexer & Monitor Module

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1 OVERVIEW

1.1 General Description of Assembly/Module

The optical multiplexer and monitor module will multiplex the 12 wavelengths from the output of the transmitters and ensure safe power levels in the output fibre of the optical multiplexer.

1.2 Sub-assembly A - DWDM

The 12 wavelengths will be multiplexed onto a single fibre using a dense wavelength division multiplexer (DWDM).

1.3 Sub-assembly B – Power Monitor

Under fault conditions at the transmitters, the optical power in the output fibre of the optical multiplexer could be hazardous. To ensure that the system is safe, the transmitters can be on only if they receive a "keep-alive" signal from the power monitor. A -20 dB optical coupler, a photodiode and a comparator circuit are used to monitor the output power levels and maintain, if appropriate, the keep-alive signals for 4 three-wavelength, optical-transmitters.

2 INTERFACES

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

- Optical transmitter boards:
 - 4 x 3 optical fibres
 - 4 keep-alive twisted pairs
- Antenna end, external fibre connector

3 SPECIFICATIONS

3.1 Performance Specifications

3.1.1 General description

This module is a composite of two sub-assemblies, the DWDM and the power monitor. The DWDM is entirely passive and will need no control. The power monitor will be designed at a later date, but as an active device, will need some control and monitoring.

3.1.1.1 Inputs

- 12 Fibre inputs from the optical transmitter boards.

3.1.1.2 Outputs

- Single fibre output
- Feedback connections to the transmitter boards

3.1.2 Sub-assembly A - DWDM

- It should be an athermal device

3.1.2.1 Inputs

- It will have a channel count of 12,16 or 24 channels

- The channels will be equally spaced on the ITU grid between 1561.42nm and 1530.33nm

3.1.2.2 Outputs

- Single fibre output

3.1.2.3 Performance

- It should have a minimum passband at -1dB of ± 200 pm and is likely to be a 200GHz device.
- It will have a worst case insertion loss of 7dB and a worst case insertion loss uniformity of 1.5dB. By preference the insertion loss will be as low as possible. Larger values of insertion loss uniformity will be considered on merit.
- It will have a worst case PDL of 0.5dB. By preference PDL will be as low as possible.
- Values of PMD and chromatic dispersion will be considered on merit and in consideration of the final design. A typical value for PMD would be 0.3ps and a typical value for chromatic dispersion will be 20ps/nm.
- Return loss will be as high as possible and typical values will be 40dB
- Acceptable levels of crosstalk will be studied in the JBO pre-production test link and individual device values considered on merit. Typical quoted values of -25dB adjacent crosstalk and -28dB non-adjacent crosstalk are acceptable

3.1.3 Sub-assembly B – Power Monitor

This device is yet to be specified

3.1.3.1 Inputs

TBD

3.1.3.2 Outputs

TBD

3.2 Monitor/Control Interface

3.2.1 General

Specify interface type(s) (CAN, RS232, GPIB,...).
List interfaces to sub-assemblies.

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

This module will not be large, since it's component parts will be relatively small. The module could be packaged in an ALMA standard rack mounted chassis and will be housed at the antenna.

3.3.1.1 General

3.3.1.2 Connectors

Connectors will be ALMA standard Diamond E-2000 APC connectors

3.3.1.3 Back panel (optional)

3.3.1.4 Front panel (optional)

3.3.1.5 Sub-assembly A - DWDM

These devices are contained within athermal packaging.

Packing size will vary dependent on manufacturer, but typical dimensions are (WxDxH) 140 x 105 x 15 mm³.

3.3.1.6 Sub-assembly B – Power Monitor

TBD

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

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