



# HP J4230A/31A/32A DWDM Transmitter Modules

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## User's Manual

### Where to Find it - Online and Printed Information:

System installation (hardware/software) .....	VXIbus Configuration Guide*
	HP VIC (VXI installation software)*
	HP SpectraIBER Installation & System Reference Manual
Module configuration .....	This Manual
Module control .....	This Manual
SCPI information .....	HP SpectraIBER Remote Control Manual
VXI programming .....	HP SpectraIBER Online Help
VXI example programs .....	HP SpectraIBER Online Help
	HP SpectraIBER Installation & System Reference Manual
	HP SpectraIBER Remote Control Manual
VXI function reference .....	HP SpectraIBER Online Help
Soft Front Panel information .....	HP SpectraIBER Installation & System Reference Manual
	HP J4225A/26A DWDM Receiver and
	HP J4230A/31A/32A DWDM Transmitter Module User's
	Manuals
	HP SpectraIBER Online Help
VISA language information .....	HP VISA User's Guide
HP VEE programming information .....	HP VEE User's Manual

*\*Supplied with HP Command Modules , Embedded Controllers, and VXLink.*

## Legal and Safety Information

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### Hewlett-packard Warranty Statement

**HP Product:** J4230A, J4231A, J4232A

**Duration Of Warranty:** 1 year

1. HP warrants HP hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If HP receives notice of such defects during the warranty period, HP will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
2. HP warrants that HP software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If HP receives notice of such defects during the warranty period, HP will replace software media which does not execute its programming instructions due to such defects.
3. HP does not warrant that the operation of HP products will be interrupted or error free. If HP is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.
4. HP products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.
5. The warranty period begins on the date of delivery or on the date of installation if installed by HP. If customer schedules or delays HP installation more than 30 days after delivery, warranty begins on the 31st day from delivery.
6. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by HP, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.
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### Responsibilities of the Customer

The customer shall provide:

1. Access to the products during the specified periods of coverage to perform maintenance.
2. Adequate working space around the products for servicing by Hewlett-Packard personnel.
3. Access to and use of all information and facilities determined necessary by Hewlett-Packard to service and/or maintain the products. (Insofar as these items may contain proprietary or classified information, the customer shall assume full responsibility for safeguarding and protection from wrongful use.)
4. Routine operator maintenance and cleaning as specified in the Hewlett-Packard Operating and Service Manuals.
5. Consumables such as paper, disks, magnetic tapes, ribbons, inks, pens, gases, solvents, columns, syringes, lamps, septa, needles, filters, frits, fuses, seals, detector flow cell windows, etc.

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### Certification

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility and to the calibration facilities of other International Standards Organization members.

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### Assistance

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

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## Laser Safety Warning

**To prevent personal injury, ensure the following information is reviewed before operating the module.**

The HP J4230A, HP J4231A and HP J4232A are classified as Class I (non-hazardous) laser products, which in the USA complies with the United States Food and Drug Administration (FDA) Standard 21 CFR Ch.1 1040.10, and Class 1 Europe complies with EN 60825-1 (1994).

For your protection, review all laser information given in this manual before installing or using this module.

To avoid hazardous exposure to laser radiation, it is recommended that you do the following:

**ALWAYS DEACTIVATE THE LASER BEFORE CONNECTING OR DISCONNECTING OPTICAL CABLES.**

*When connecting or disconnecting cables between the module(s) and the device-under-test, observe the connection sequence given below:*

**Connecting:** Connect the optical cable to the device-under-test **before** connecting to the module's optical output connector.

**Disconnecting:** Disconnect the optical cable from the module's optical output connector **before** disconnecting from the device-under-test. Always ensure the screw cap is fitted properly on to the laser aperture.

NEVER examine or stare into the open end of a broken, severed, or disconnected optical cable when it is connected to the module's optical output connector.

Arrange for service-trained personnel, who are aware of the hazards involved, to repair optical cables.

**Use of controls or adjustments or performance procedures other than those specified herein may result in hazardous radiation exposure.**

The following labels appears on the front panel of the module and indicate that a laser is fitted and that the radiation is non-hazardous.



CLASS 1 LASER PRODUCT translates as follows:

Finnish - LUOKAN 1 LASERLAITE

Finnish/Swedish - KLAS 1 LASER APPARAT

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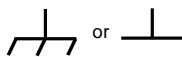
## Safety Symbols



Instruction manual symbol affixed to product. Indicates that the user must refer to the manual for specific WARNING or CAUTION information to avoid personal injury or damage to the product.



Indicates the field wiring terminal that must be connected to earth ground before operating the equipment—protects against electrical shock in case of fault.



Frame or chassis ground terminal—typically connects to the equipment's metal frame.



Alternating current (AC)



Direct current (DC).



**WARNING**

Indicates hazardous voltages.

**CAUTION**

Calls attention to a procedure, practice, or condition that could cause bodily injury or death.

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.



Indicates that a laser is fitted. The user must refer to the manual for specific Warning or Caution information to avoid personal injury or damage to the product.

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## Warnings

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

**Ground the equipment:** For Safety Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.

For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holders.

**Keep away from live circuits:** Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

**DO NOT operate damaged equipment:** Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

**DO NOT service or adjust alone:** Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

**DO NOT substitute parts or modify equipment:** Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

**Operating Location:** Sheltered location where air temperature and humidity are controlled within this product's specifications and the product is protected against direct exposure to climatic conditions such as direct sunlight, wind, rain, snow, sleet, and icing, water spray or splash, hoarfrost or dew. (Typically, indoor.) Pollution environment for which this product may be operated is IEC 664 Pollution degree 2.

**Module connectors and test signal cables connected to them cannot be operator accessible.** Cables and connectors are considered inaccessible if a tool (e.g., screwdriver, wrench, socket, etc.) or a key (equipment in a locked cabinet) is required to gain access to them. Additionally, the operator cannot have access to a conductive surface connected to any cable conductor (High, Low or Guard).

**Assure the equipment under test has adequate insulation between the cable connections and any operator-accessible parts (doors, covers, panels, shields, cases, cabinets, etc.).** Verify there are multiple and sufficient protective means (rated for the voltages you are applying) to assure the operator will NOT come into contact with any energized conductor even if one of the protective means fails to work as intended. For example, the inner side of a case, cabinet, door, cover or panel can be covered with an insulating material as well as routing the test cables to the module's front panel connectors through non-conductive, flexible conduit such as that used in electrical power distribution.

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## Statement of Compliance

This module has been designed and tested in accordance with IEC Publication 1010-1 + A1:1992 Safety requirements for Electrical Equipment for Measurement, Control and Laboratory Use, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the module in a safe condition.



The CE mark shows that the product complies with all relevant European legal Directives.

ISM 1-A

This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.



The CSA mark is a registered trademark of the Canadian Standards Association.

### Australian EMC Regulations



The C-Tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework Regulations under the terms of the Radiocommunications Act of 1992.

### Noise Declaration (German)

LpA<70dB

am Arbeitsplatz (operator position)  
normaler Betrieb (normal position)  
nach DIN 45635 pt.19 (per ISO 7779)

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## Electromagnetic Compatibility

This product has been designed to meet the protection requirements of the European Communities Electromagnetic Compatibility (EMC) directives:

CISPR11 Level A  
EN50082-1:1992

In order to preserve the EMC performance of the product, any cable which becomes worn or damaged must be replaced with the same type and specification. Also ensure that any spare slots in the VXI Mainframe are fitted with blanking plates (HP E8400-60202).

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## Fuse Information

Fuses on the HP J4225/26A DWDM Receiver Modules and the HP J4230A/31A/32A DWDM Transmitter Modules are **not** user replaceable.

In both the HP DWDM Receiver and the DWDM Transmitter Modules the fuses are:

HP Ref.	HP Part No.	Amp	Volt	Type
F1, F2	2110-0945	3 A	125 V	NB*
F3, F4, F500, F501	2110-0946	10 A	125 V	NB*
F5	2110-1138	15 A	125 V	NB*
F6	2110-0936	4 A	125 V	NB*

\* NB = Normal Blow

## Declaration of Conformity

according to ISO/IEC Guide 22 and EN45014

**Manufacturer's Name:** Hewlett-Packard Ltd.

**Manufacturer's Address:** Telecomms Networks Test Division  
South Queensferry  
West Lothian, EH30 9TG  
Scotland, United Kingdom

Declares that the product

**Product Name:** HP SpectralBER DWDM Transmitter

**Model Number:** HP J4230A

**Product Options:** This declaration covers all options of the above product as detailed in  
TCF A-5951-9852-01

Conforms with the protection requirements of European Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic compatibility, against EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992 .

**As Detailed in:** Electromagnetic Compatibility (EMC)  
Technical Construction File (TCF) No. A-5951-9852-01

**Assessed by:** DTI Appointed Competent Body  
EMC Test Centre,  
GEC-Marconi Avionics Ltd.,  
Maxwell Building,  
Donibristle Industrial Park,  
Hillend,  
Dunfermline  
KY11 9LB  
Scotland, United Kingdom

Technical Report Number:6893/2200/CBR, dated 21August 1997

### Supplementary Information:

The product conforms to the following safety standards:

EN 61010-1(1993)  
IEC 61010-1(1990) +A1(1992) +A2(1995)  
CSA-C22.2 No. 1010.1-93  
CFR Ch.1 1040.10  
EN 60825-1(1994) / IEC 825-1(1993)

The product herewith complies with the requirements of the General Product Safety Directive 92/59/EEC.

**South Queensferry, Scotland**

**30 July 1999**



**Location**

**Date**

**W.R. Pearson / Quality Manager**

Europe Contact:  
Your Local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department 2Q / Standards Europe  
Herrenberger Strasse 130, D7030 Boblingen (Fax: +49-7031-143143)

## Declaration of Conformity

according to ISO/IEC Guide 22 and EN45014

**Manufacturer's Name:** Hewlett-Packard Ltd.

**Manufacturer's Address:** Telecomms Networks Test Division  
South Queensferry  
West Lothian, EH30 9TG  
Scotland, United Kingdom

Declares that the product

**Product Name:** HP SpectralBER DWDM Transmitter

**Model Number:** HP J4231A

**Product Options:** This declaration covers all options of the above product as detailed in  
TCF A-5951-9852-01

Conforms with the protection requirements of European Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic compatibility, against EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992 .

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South Queensferry  
West Lothian, EH30 9TG  
Scotland, United Kingdom

Declares that the product

**Product Name:** HP SpectralBER DWDM Transmitter

**Model Number:** HP J4232A

**Product Options:** This declaration covers all options of the above product as detailed in  
TCF A-5951-9852-01

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**As Detailed in:** Electromagnetic Compatibility (EMC)  
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### Introduction

This manual provides you with information about the following Dense Wave Division Multiplexing (DWDM) transmit modules:

- HP J4230A Optical Transmitter
- HP J4231A Optical Transmitter
- HP J4232A Optical Transmitter

### Description

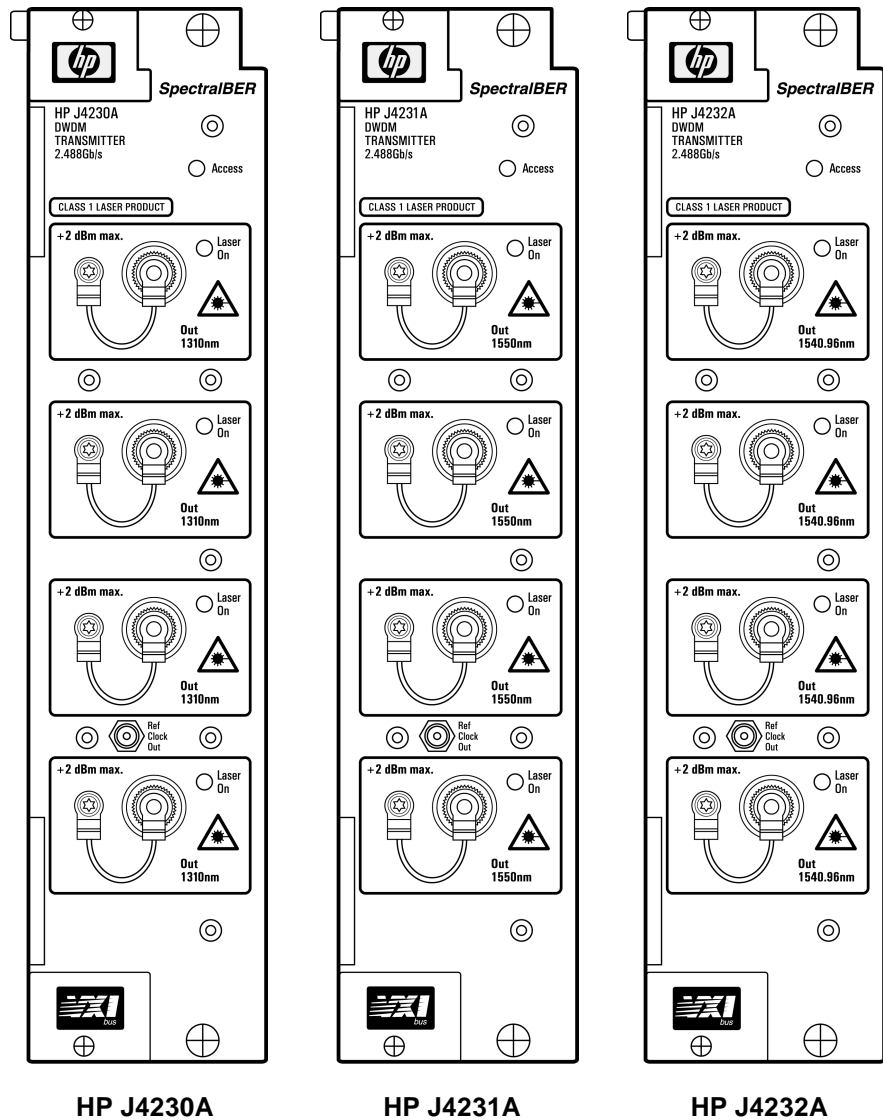
The HP J4230A, HP J4231A and HP J4232A are register-based C-size double slot VXI modules. Each module has four optical output ports with the following wavelengths:

- 1310 nm for all HP J4230A optical ports.
- 1550 nm for all HP J4231A optical ports.
- ITU-T 1550 nm for the HP J4232A optical ports. This module can provide a different wavelength for each optical port. These wavelengths conform to the ITU standard and have 50 GHz spacing.

These modules can transmit SDH STM16 or SONET OC48 structured signals to which B1, B2 bit errors can be added and the J0 trace configured.

The 2.4 Gb/s signals are clocked from the same clock source on each module. The clock source also provides an external reference clock for each module.

# Front Panel Features



## Optical Out Ports

The HP J4230A, HP J4231A and HP J4232A modules each have four optical ports, the wavelengths and maximum optical power for each port is listed below:

- 1310 nm, +2 dBm for the HP J4230A
- 1550 nm, +2 dBm for the HP J4231A (+4 dBm for Option 001)
- ITU-T 1550 nm, +2 dBm for HP J4232A

## Ref Clock Out Port

These modules provides a 2.4 Gb/s external clock output.

## LEDs

**Access**

This LED lights when the module is being accessed over the VXIbus backplane.

**Laser On**

This yellow LED lights when the optical output is enabled.

## Module Identification

An identification label is attached to the module clamshell enclosure. The serial number on the label has a two letter reference denoting country of origin (GB = Great Britain) and an eight digit serial number. The serial number is unique to each module and should be quoted in all correspondence with Hewlett-Packard, especially when ordering replacement parts.



## Safety Precautions for the Operator

The following general safety precautions must be observed during all phases of operation, service, and repair of this module. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the module. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

In particular, the operator should note the following safety information:

- “Laser Safety Warning” on page 3
- “Safety Symbols” on page 4
- “ESD Precautions” on page 14
- “Operators Maintenance” on page 14

**DO NOT** operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure the safety features are maintained.

## Additional Safety Precautions for Service Engineers

**DO NOT** substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modifications to the module. Return the module to a Hewlett-Packard Sales and Service Office for service and repair to ensure the safety features are maintained.

**DO NOT** service or adjust alone: Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, service trained personnel must not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

# ESD Precautions

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**Caution** The module contains components sensitive to electrostatic discharge. To prevent component damage, carefully follow the handling precautions presented below.

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The smallest static voltage most people can feel is about 3500 volts. It takes less than one tenth of that (about 300 volts) to destroy or severely damage static sensitive circuits. Often, static damage does not immediately cause a malfunction but significantly reduces the component's life. Adhering to the following precautions will reduce the risk of static discharge damage.

- Keep the module in its conductive storage box when not installed in the VXI Mainframe. Save the box for future storage of the module.
- Before handling the module, select a work area where potential static sources are minimized. Avoid working in carpeted areas and non-conductive chairs. Keep body movement to a minimum. Hewlett-Packard recommends that you use a controlled static workstation.
- Handle the module by its front panel. Avoid touching any components or edge connectors. When you install the module, keep one hand in contact with the protective bag as you pick up the module with your other hand. Then, before installing the module, make contact with the metal surface of the VXI Mainframe with your free hand to bring you, the module and the VXI Mainframe to the same static potential. This also applies whenever you connect/disconnect cables on the front panel.

## Operators Maintenance

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**WARNING** NO OPERATOR SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. TO PREVENT ELECTRICAL SHOCK DO NOT REMOVE COVERS.

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Maintenance appropriate for the operator is:

- Cabinet cleaning
- Optical Connector Cleaning

### Cleaning

**Cabinet Cleaning** Clean the cabinet using a damp cloth only.

## Optical Connector Cleaning

It is recommended that the optical connectors be cleaned at regular intervals using the following materials:

Description	HP Part Number
Blow Brush	9300-1131
Isopropyl Alcohol	8500-5344
Lens Cleaning Paper	9300-0761
Adhesive Tape Kit	15475-68701

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**Caution** Do not insert any tool or object into the IN or OUT ports of the module as damage to or contamination of the optical fibre may result.

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1. Switch off the VXI Mainframe, then remove the power cord from the ac mains power socket.
2. Remove the adapters from the **Out** ports.
3. Using the blow brush with the brush removed blow through the ferrule of the standard flexible connector and the adapter.

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**Caution** If the optical fibre of the fixed connector requires further cleaning this entails disassembly of the module which should only be carried out by suitably trained service personnel.

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4. Apply some isopropyl alcohol to a piece of the cleaning paper and clean the barrel of the adapter. Using a new piece of cleaning paper, clean the face of the adapter. Repeat this operation, using a new piece of cleaning paper each time.
5. Lightly press the adhesive side of the tape provided against the front of the adapter, then remove it quickly - repeat twice. This removes any particles of cleaning paper which may be present.
6. Replace the adapters on the flexible connector.

# Storage and Shipment

The module may be stored or shipped in environments within the following limits:

**Temperature:** -10 °C to +70 °C

**Altitude:** Up to 15,200 meters (50,000 feet)

**Humidity:** up to 95% relative humidity to 40 °C.

The module should also be protected from temperature extremes which could cause condensation within the module.

## Repackaging for Shipment

### Tagging for Service

If the module is being returned to Hewlett-Packard for service, please complete a repair tag and attach it to the module.

### Original Packaging

Containers and materials identical to those used in factory packaging are available from Hewlett-Packard offices. If the module is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. Mark the container FRAGILE to ensure careful handling. In any correspondence, refer to the module by model number and full serial number.

### Other Packaging

The following general instructions should be followed when repackaging with commercially available materials:

- Wrap module in heavy paper or plastic. If the module is being shipped to Hewlett-Packard, attach a tag indicating the type of service required, return address, model number and full serial number.
- Use a strong shipping container. A double wall carton made of 350-pound test material is adequate.
- Use a layer of shock absorbing material 70 to 100 mm (3 to 4 inch) thick, around all sides of the module to provide firm cushioning and prevent movement inside the container. Protect the Front Panel controls and Rear Panel connectors with cardboard.
- Seal shipping container securely.
- Mark shipping container FRAGILE to ensure careful handling.
- In any correspondence, refer to module by model number and full serial number.

**Weight** 3.1 kg (6.8 lb)

**Dimensions** 261 mm (10.3 in) high, 60 mm (2.36 in) wide, 360 mm (14 in) deep



### Initial Inspection

---

**WARNING** TO AVOID HAZARDOUS ELECTRICAL SHOCK, DO NOT PERFORM ELECTRICAL TESTS WHEN THERE ARE SIGNS OF SHIPPING DAMAGE TO ANY PORTION OF THE OUTER ENCLOSURE (COVERS, PANELS, METERS).

---

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the module has been checked both mechanically and electrically. Procedures for checking electrical operation are given in Chapter 3. If the contents of the shipment are incomplete, if there is mechanical damage or defect, notify the nearest Hewlett-Packard office. If the module does not pass the electrical performance tests given in Chapter 3, notify the nearest Hewlett-Packard office. If the shipping container is also damaged, or the cushioning material shows signs of stress, notify the carrier as well as the nearest Hewlett-Packard office. Keep the shipping materials for the carrier's inspection. The Hewlett-Packard office will arrange for repair or replacement without waiting for claim settlement.

### Operating Environment

This module is designed for indoor use only. **DO NOT** operate the product in an explosive atmosphere or in the presence of flammable gasses or fumes.

This module may be operated in environments within the following limits:

**Temperature:** 0° C to +40° C.

**Altitude:** up to 3050m (10,000ft).

**Humidity:** up to 95% relative humidity to 40 °C.

The module should be protected from temperature extremes which may cause condensation.

---

**Caution** The module is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 644 respectively.

---

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**Caution** **VENTILATION REQUIREMENTS:** When installing the module in a cabinet, the convection into and out of the module must not be restricted.

---

# Preparation for Use



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**Caution** Damage can occur to the optical input ports of the HP J4225A and HP J4226A if they are connected directly to the optical output ports of the HP J4231A Option 001.

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**Caution** If a module is not used as specified, the protection provided by the equipment could be impaired. The module must be used in a normal condition only (in which all means of protection are intact).

---

## Power Requirements

The modules are powered by dc voltages provided from the backplane of the VXI Mainframe that houses the modules during normal operation. Power consumption of each module is 89.3 W.

## Connecting to a Network

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**Caution** Before connecting or disconnecting, ensure that you are grounded, or make contact with the metal surface of the VXI Mainframe with your free hand to bring you, the module, and the mainframe to the same static potential. Modules remain susceptible to ESD damage while the module is installed in the VXI Mainframe. Additional ESD information is required when servicing see “ESD Precautions” on page 14.

---

## Optical Interface Adapters

FC/PC optical interface adapters are supplied with the module. Alternative optical interface adapters that can be used with this module are listed below:

Interface Type	Part Number
Biconic	HP 81000WI
D4	HP 81000GI
Diamond HMS-10/HP	HP 81000AI
DIN 47256	HP 81000SI
SC	HP 81000KI
SMA	HP 81000JI
ST	HP 81000VI

## SMA Adaptors

These adaptors (HP 1250-1462) are available and can be screwed on to the Ref Clock Out port to protect the threads of the connector.

# Installing and Removing the Module

**Caution** Review the “ESD Precautions” on page 14 before installing or removing modules. Do not install or remove a module while the VXI Mainframe is powered-up. Doing so may cause irreparable damage to the module or the VXI Mainframe.

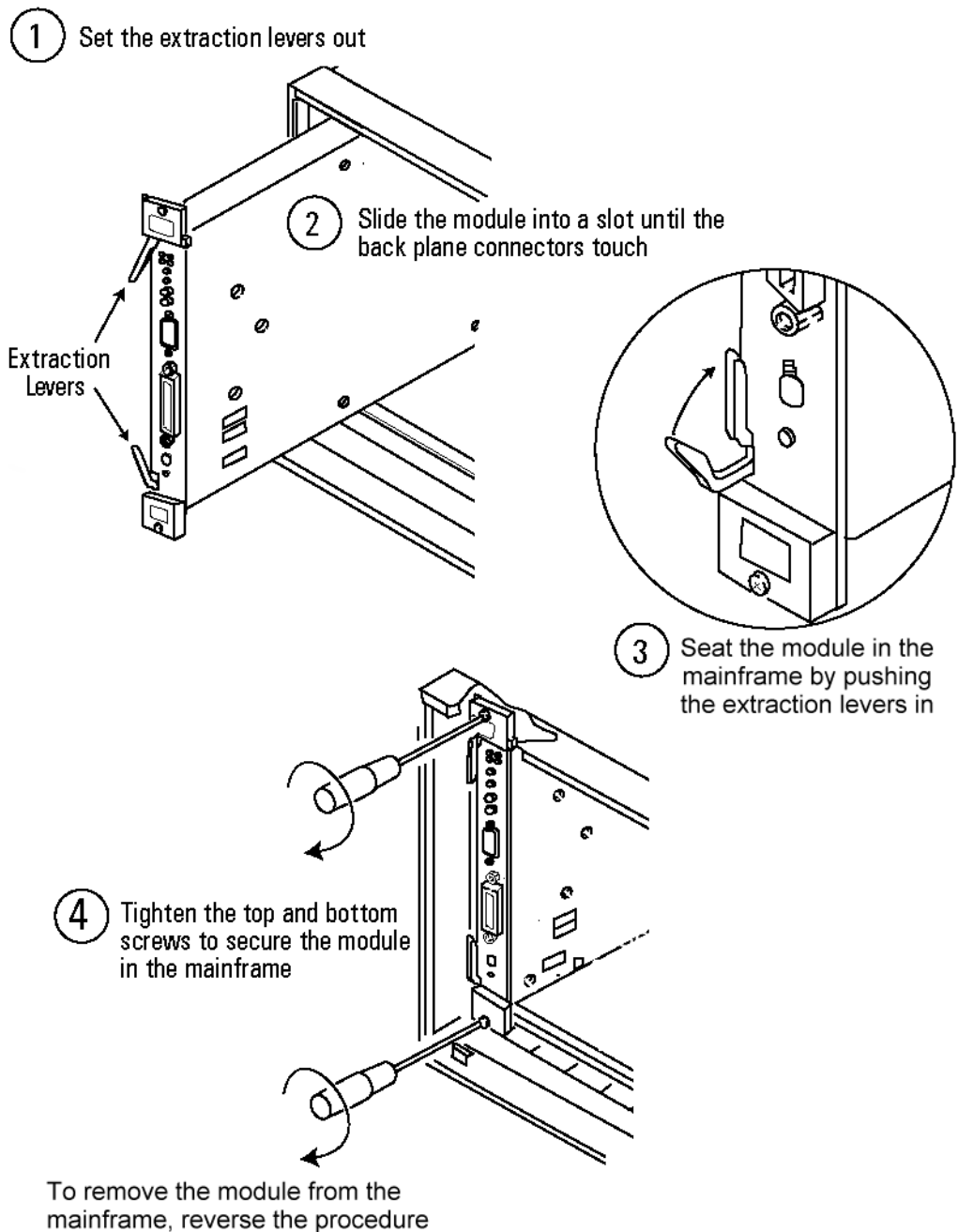


Figure 2-1. Installing and Removing a Module

## Addressing

The optical transmit modules are servants to the HP J4223A DWDM Controller (commander module). The logical address of each optical transmit module must be within the servant area of the DWDM Controller.

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**Caution** Before assigning a logical address to an optical transmit module, check the logical address and servant area switch settings of the DWDM Controller module.

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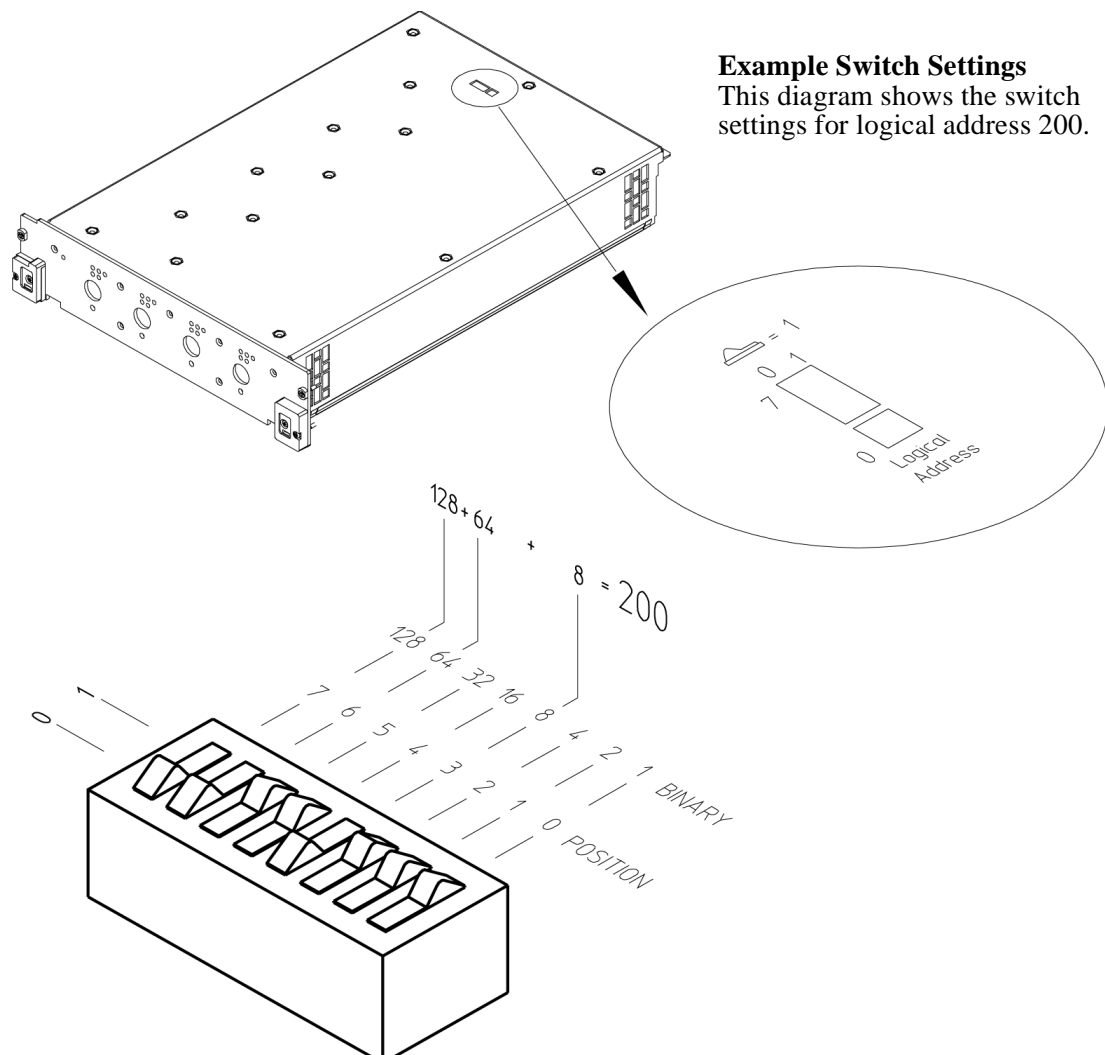
You assign a logical address to an optical transmit module by setting a series of switches which you access through a slot in the module's clamshell enclosure, see the following diagram. The switches are binary weighted, the weightings 0 (LSB) to 7 (MSB) are marked on the clamshell enclosure.

Ensure the logical address you select falls within the servant area of the HP J4223A DWDM Controller.

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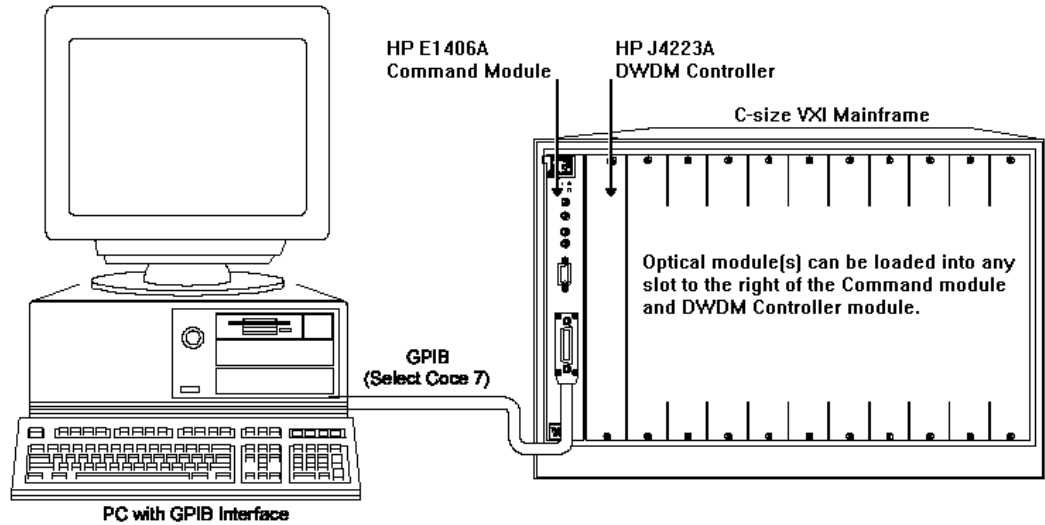
**Note** The value you select must not conflict with the logical address of any other module(s) serving the DWDM Controller module.

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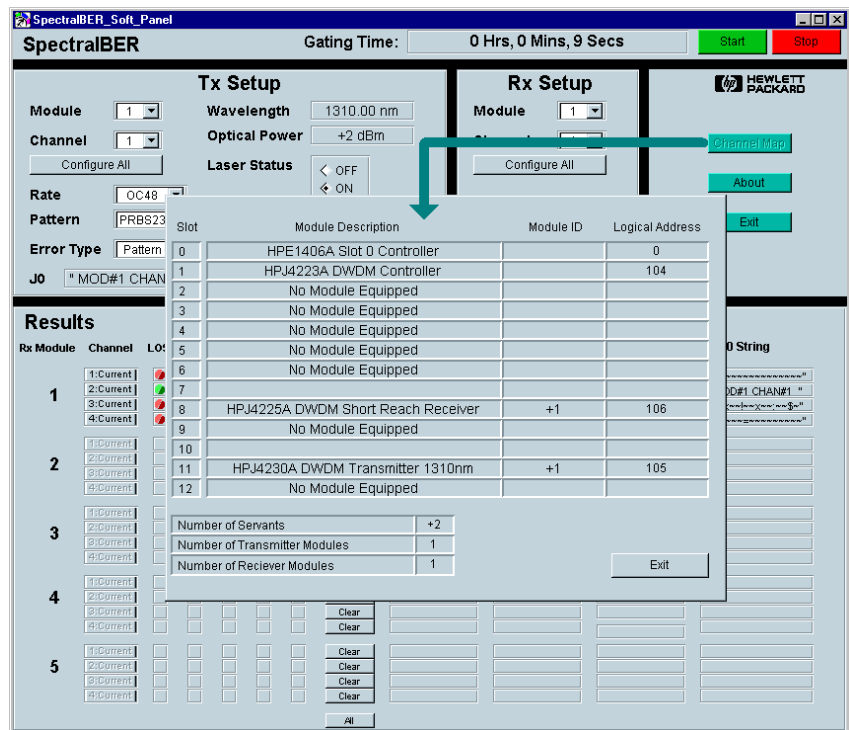
## Module Slot Location

It is recommended that modules be loaded as shown below.



## Verify Module Installation

You can verify module installation using soft panels. (Soft panel software installation information will be found in the *Installation & System Reference Manual*.) The following diagram shows a typical soft panel and how to verify which modules are installed in a VXI Mainframe. When you click on the Show Status button, details of the total number of servants and the number of individual Receivers and Transmitters are displayed.





# Chapter 3 Module Control

## Introduction

The DWDM Transmitter modules can be controlled from a PC or workstation using SCPI commands, Universal Instrument Drivers or manually using soft panels. If you want to control modules using soft panels on your display, you will need install the appropriate soft panel software.

For more information on installing soft panel software and controlling modules manually, see the HP SpectralBER *Installation & System Reference Manual*.

For more information on SCPI commands, see the HP SpectralBER *Remote Control Manual*.

## Transmit Module Soft Panel Overview

The following diagram shows a typical soft panel, and also shows you how to set up an Optical Transmit module.

To set up an Optical Transmit module:

1. Click here to select a module.
2. Click here to select a channel (1 to 4).
3. Click here to apply the displayed settings to all modules.
4. Click here to select a rate (STM-16c or OC-48C).
5. Click here to select a pattern (PRBS23, PRBS15, PRBS11 or PRBS9).
6. Click here to select an error type (B1, B2 or bit).
7. Click here to edit the trace message.
8. Click here to select an error rate (single or  $1 \times 10^{-n}$  where  $n = 7$  to  $9$ ).
9. Click the here to add single errors.

The screenshot shows the 'Tx Setup' soft panel. It includes fields for Module (1), Channel (1), Rate (OC48), Pattern (PRBS23), Error Type (Pattern), and Error Rate (OFF). There are also buttons for 'Configure All', 'Single Error Add', and 'Change J0'. A 'Laser Status' section has radio buttons for OFF and ON. A 'Results' table is visible at the bottom, showing error counts for various modules and channels.

Rx Module	Channel	LOS	OO	LOF	PS	ERROR	HISTORY	B1 Count	B2 Count	J0 String
1	1 Count	#	#	#	#	Clear		+9.91E+37	+9.91E+37	**MOD#1 CHAN#1 *
	2 Count	#	#	#	#	Clear		+9.91E+37	+9.91E+37	"#"
	3 Count	#	#	#	#	Clear		+9.91E+37	+9.91E+37	"#"
	4 Count	#	#	#	#	Clear		+9.91E+37	+9.91E+37	"#"
2	1 Count					Clear				
	2 Count					Clear				
	3 Count					Clear				
	4 Count					Clear				
3	1 Count					Clear				
	2 Count					Clear				
	3 Count					Clear				
	4 Count					Clear				
4	1 Count					Clear				
	2 Count					Clear				
	3 Count					Clear				
	4 Count					Clear				
5	1 Count					Clear				
	2 Count					Clear				
	3 Count					Clear				
	4 Count					Clear				





# Chapter 4

## Performance Tests

### Introduction

This chapter contains information to enable you to test the warranted specifications of the HP J4230A, J4231A and J4232A DWDM Transmitter modules in the HP J4221A and J4222A DWDM SpectralBER system.

**Note** The warranted specifications are supplied as part of the documentation package provided with the system.

### Recommended Test Equipment

Table 4-1 lists the equipment required for performance testing of the system. Alternative equipment that meets or exceeds the critical specification of the listed equipment may be substituted. Recommended models are those typically used in HP Service Centers.

**Table 4-1. Recommend Test Equipment**

Instrument	Critical Specification	Recommended Model
Frequency Counter	Range: 0 to 200MHz	HP 5335A Option 010
Lightwave Multimeter		HP 8153A
Multi Wavelength Meter		HP 86120B
Optical Attenuator	Wavelength: 1200 to 1600 nm Range: 0 to 30db	HP 8157A
FC/PC Optical Interface Connector	Unique	HP 81000FI (x 4)
Optical Cable	Unique	HP 11871A (x 2)
Cable	SMA to SMA 0.5 meter	HP E1675-64210
Adapter	SMA (female) to BNC (male)	HP 1250-2015

### Calibration Cycle

Depending on the use and environmental conditions, the performance of the modules should be checked once a year, by using the following performance tests.

### Performance Test Record

The results of the performance tests can be recorded on the performance test record at the end of the tests. The performance test record lists all the tested specifications and the acceptable limits. The results recorded at incoming inspection can be used for comparison during periodic maintenance, troubleshooting or after repair or adjustment.

# Transmitter Clock Test

## Specifications

**Table 4-2. Transmitter Clock Specifications (All Modules)**

Internal Frequency:	2.48832 GHz $\pm$ 3.5 ppm
Measured Frequency:	77.76 MHz $\pm$ 3.5 ppm ( $\pm$ 272.26 Hz)
Aging:	$\pm$ 1 ppm/year ( $\pm$ 77.76 Hz)
Level:	Unbalanced TTL

## Description

This test verifies that the 2.4GHz internal Clock is within its specified limits, by measuring a divided-down version of the clock at the Ref Clock Out port. The Ref Clock Out port is a SMA-type connector that outputs an unbalanced TTL level signal. (The limits take in to account the accuracy, stability and ageing of the clock and assume that the module is within its calibration cycle.)

## Equipment Required

Frequency Counter:	HP 5335A Option 010
Cable, SMA to SMA (0.5 meter):	HP E1675-64210
Adapter, SMA (female) to BNC (male):	HP 1250-2015

## Procedure

1. Connect the **Ref Clock Out** port to the Frequency Counter.
2. Check that the measured clock frequency is 77,760000 MHz  $\pm$ 350 Hz. (Equivalent to an internal clock frequency of 2.48832 GHz  $\pm$ 11.2 kHz.)
3. Disconnect the Frequency Counter.
4. Repeat steps 1 to 3 for all DWDM Transmitter modules.

# Transmitter Optical Power and Wavelength Test

## Specifications

**Table 4-3. HP J4230A Optical Power and Wavelength Specifications**

Wavelength:	1310 nm $\pm$ 20 nm
Power Output:	Maximum: +2 dBm Minimum: -1 dBm Typical: +1dBm
Safety Class:	Class 1

**Table 4-4. HP J4231A Optical Power and Wavelength Specifications**

Wavelength:	1550 nm $\pm$ 5 nm
Power Output: Std.	Maximum: +2 dBm Minimum: -1 dBm Typical: +1 dBm
Option 001	Maximum : +4 dbm Minimum : +1 dbm Typical: +3 dbm
Safety Class:	Class 1

**Table 4-5. HP J4232A Optical Power and Wavelength Specifications**

Option:	Wavelength:	Option:	Wavelength:
001	1536.61nm ±0.07 nm	031	1548.51nm ±0.07 nm
002	1537.01nm ±0.07 nm	032	1548.91nm ±0.07 nm
003	1537.40nm ±0.07 nm	033	1549.32nm ±0.07 nm
004	1537.90nm ±0.07 nm	034	1549.72nm ±0.07 nm
005	1538.19nm ±0.07 nm	035	1550.12nm ±0.07 nm
006	1538.59nm ±0.07 nm	036	1550.52nm ±0.07 nm
007	1538.98nm ±0.07 nm	037	1550.92nm ±0.07 nm
008	1539.38nm ±0.07 nm	038	1551.32nm ±0.07 nm
009	1539.77nm ±0.07 nm	039	1551.72nm ±0.07 nm
010	1540.17nm ±0.07 nm	040	1552.12nm ±0.07 nm
011	1540.56nm ±0.07 nm	041	1552.52nm ±0.07 nm
012	1540.96nm ±0.07 nm	042	1552.92nm ±0.07 nm
013	1541.35nm ±0.07 nm	043	1553.33nm ±0.07 nm
014	1541.75nm ±0.07 nm	044	1553.73nm ±0.07 nm
015	1542.14nm ±0.07 nm	045	1554.13nm ±0.07 nm
016	1542.54nm ±0.07 nm	046	1554.53nm ±0.07 nm
017	1542.94nm ±0.07 nm	047	1554.94nm ±0.07 nm
018	1543.33nm ±0.07 nm	048	1555.34nm ±0.07 nm
019	1543.73nm ±0.07 nm	049	1555.75nm ±0.07 nm
020	1544.12nm ±0.07 nm	050	1556.15nm ±0.07 nm
021	1544.53nm ±0.07 nm	051	1556.55nm ±0.07 nm
022	1544.91nm ±0.07 nm	052	1556.95nm ±0.07 nm
023	1545.32nm ±0.07 nm	053	1557.36nm ±0.07 nm
024	1545.72nm ±0.07 nm	054	1557.76nm ±0.07 nm
025	1546.12nm ±0.07 nm	055	1558.17nm ±0.07 nm
026	1546.52nm ±0.07 nm	056	1558.57nm ±0.07 nm
027	1546.92nm ±0.07 nm	057	1558.98nm ±0.07 nm
028	1547.32nm ±0.07 nm	058	1559.39nm ±0.07 nm
029	1547.72nm ±0.07 nm	059	1559.79nm ±0.07 nm
030	1548.12nm ±0.07 nm	060	1560.20nm ±0.07 nm
		061	1560.61nm ±0.07 nm

Power Output: Maximum: +2 dBm  
Minimum: -1 dBm  
Typical: +1 dBm

Safety Class: Class 1

**Description**

This test verifies the Optical Output Power and Wavelength at each of the Transmitter optical **Out** ports.

**Equipment Required**

Lightwave Multimeter	HP 8153A
Multi-wavelength Meter:	HP 81620B
Optical Cables:	HP 11871A (x 2)
FC/PC Optical Connectors:	HP 81000FI (x 2)

## Procedure

### HP J4230A Transmitter Module

---

**WARNING** At switch-on, the Transmitter Lasers are enabled in the ON condition. Ensure that at any unused optical “Out” ports are fitted with an optical cover BEFORE switching on.

---

1. Switch on the VXI mainframe and check that all the Transmitter Module **Laser On** LEDs are ON (indicating that the lasers are enabled).
2. Connect one of the optical **Out** ports on the Transmitter Module to the HP 8153A (ensure that all connections are tight and that the cable has no twists).
3. Set up the HP 8153A as follows:
  - a. Press **PARAM** key to display wavelength [ $\lambda$ ]
  - b. Using **←**, **→**, **↑** and **↓** keys, set the wavelength to 1310 nm.
  - c. Press **PARAM** key to display Time [t]
  - d. Using **←**, **→**, **↑** and **↓** keys, set the time to 20 mS.
  - e. Press **PARAM** key to display REF.
  - f. Using **←**, **→**, **↑** and **↓** keys, set the REF to 0.00 dBm.
  - g. Press **PARAM** key to display CAL.
  - h. Using **←**, **→**, **↑** and **↓** keys, set the CAL to 0.000 dBm.
  - i. Press the **ZERO** key on the Power Meter to calibrate - the Power Meter is now ready.
4. Press **MODE** to select the Power Level measurement on the HP 8153A.
5. Check that the optical power reading is between -1 dBm and +2 dBm.
6. Disconnect the optical cable from the HP 8153A and connect it to the HP 81620B.
7. Press **PRESET** on the HP 81620A.
8. Check that the wavelength is 1310 nm  $\pm$ 20 nm.
9. Repeat steps 2 to 8 for all optical **Out** ports on this module and any other HP J4230A Transmitter modules.

## HP J4231A Transmitter Module

### WARNING

---

At switch-on, the Transmitter Lasers are enabled in the ON condition. Ensure that at any unused optical “Out” ports are fitted with an optical cover BEFORE switching on.

---

1. Switch on the VXI mainframe and check that all the Transmitter Module **Laser On** LEDs are ON (indicating that the lasers are enabled).
2. Connect one of the optical **Out** ports on the Transmitter Module to the HP 8153A (ensure that all connections are tight and that the cable has no twists).
3. Set up the HP 8153A as follows:
  - a. Press **PARAM** key to display wavelength [ $\lambda$ ]
  - b. Using **←**, **→**, **↑** and **↓** keys, set the wavelength to 1310 nm.
  - c. Press **PARAM** key to display Time [t]
  - d. Using **←**, **→**, **↑** and **↓** keys, set the time to 20 mS.
  - e. Press **PARAM** key to display REF.
  - f. Using **←**, **→**, **↑** and **↓** keys, set the REF to 0.00 dBm.
  - g. Press **PARAM** key to display CAL.
  - h. Using **←**, **→**, **↑** and **↓** keys, set the CAL to 0.000 dBm.
  - i. Press the **ZERO** key on the Power Meter to calibrate - the Power Meter is now ready.
4. Press **MODE** to select the Power Level measurement on the HP 8153A.
5. Check that the optical power reading is between -1 dBm and +2 dBm.
6. Disconnect the optical cable from the HP 8153A and connect it to the HP 81620B.
7. Press **PRESET** on the HP 81620A.
8. Check that the wavelength is 1550 nm  $\pm$ 5 nm.
9. Repeat steps 2 to 8 for all optical **Out** ports on this module and any other HP J4231A Transmitter modules.

## HP J4232A Transmitter Module

### WARNING

---

**At switch-on, the Transmitter Lasers are enabled in the ON condition. Ensure that at any unused optical “Out” ports are fitted with an optical cover BEFORE switching on.**

---

1. Switch on the VXI mainframe and check that all the Transmitter Module **Laser On** LEDs are ON (indicating that the lasers are enabled).
2. Connect one of the optical **Out** ports on the Transmitter Module to the HP 8153A (ensure that all connections are tight and that the cable has no twists).
3. Set up the HP 8153A as follows:
  - a. Press **PARAM** key to display wavelength [ $\lambda$ ]
  - b. Using **←**, **→**, **↑** and **↓** keys, set the wavelength to 1310 nm.
  - c. Press **PARAM** key to display Time [t]
  - d. Using **←**, **→**, **↑** and **↓** keys, set the time to 20 mS.
  - e. Press **PARAM** key to display REF.
  - f. Using **←**, **→**, **↑** and **↓** keys, set the REF to 0.00 dBm.
  - g. Press **PARAM** key to display CAL.
  - h. Using **←**, **→**, **↑** and **↓** keys, set the CAL to 0.000 dBm.
  - i. Press the **ZERO** key on the Power Meter to calibrate - the Power Meter is now ready.
4. Press **MODE** to select the Power Level measurement on the HP 8153A.
5. Check that the optical power reading is between -1 dBm and +2 dBm.
6. Disconnect the optical cable from the HP 8153A and connect it to the HP 81620B.
7. Press **PRESET** on the HP 81620A.
8. Check that the wavelength is within the limits shown in the specifications in Table 4-5, “HP J4232A Optical Power and Wavelength Specifications”, on page 28.
9. Repeat steps 2 to 8 for all optical **Out** ports on this module and any other HP J4230A Transmitter modules.

# Performance Test Record

**HP J4230A, J4231A, J4232A**  
**SpectralBER DWDM Transmitter Modules**

Location: \_\_\_\_\_ Serial No.: \_\_\_\_\_  
 \_\_\_\_\_ Tested by: \_\_\_\_\_  
 Temperature: \_\_\_\_\_ Certified by: \_\_\_\_\_  
 Humidity: \_\_\_\_\_ Date: \_\_\_\_\_

Page	Test Description		Result		
			Min.	Actual	Max.
26	<b>Transmitter Clock Test</b>				
26	Step 2	77,760,000 MHz	77,759,650 MHz		77,760,350 MHz
29	<b>Transmitter Optical Power &amp; Wavelength Test HP J4230A</b>				
29	Step 1	On/Off		On/Off	
29	Step 5	>-1 dBm <+2 dBm	-1 dBm		+2 dBm
29	Step 8	1310 nm	1290 nm		1330 nm
29	Step 9	Repeat 2 to 8		Pass/Fail	
30	<b>Transmitter Optical Power &amp; Wavelength Test HP J4231A</b>				
30	Step 1	On/Off		On/Off	
30	Step 5	Standard: >-1 dBm <+2 dBm	-1 dBm		+2 dBm
30	Step 8	1550 nm	1545 nm		1555 nm
30	Step 9	Repeat 2 to 8		Pass/Fail	
31	<b>Transmitter Optical Power &amp; Wavelength Test HP J4232A</b>				
31	Step 1	On/Off		On/Off	
31	Step 5	>-1 dBm <+2 dBm	-1 dBm		+2 dBm
31	Step 8	See Table Table 4-5. on page 28		Pass/Fail	
31	Step 9	Repeat 2 to 8		Pass/Fail	