cOPM-A1
Optical Power Meter

| Operating Manual | BN 2297/02 |

◇ JDSU

The description of additional features of the device can be found at:

http://www.jdsu.com/test

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CONTENT

1 INTRODUCTION

cOPM-A1 Optical Power Meter

The Optical Power Meter (BN 2297/02) measures power levels on fiber optic systems.

The cOPM-A1 Test set is specially designed for high performance testing of all optical signals and systems, i.e. broadband, PONs, and Gigabit Ethernet.

AC line operation via a separate AC adapter and the USB interface for remote control ensure ease of use in the laboratory. The Compact Photonic Tools are stackable, so you can assemble individual test sets.

Common features

The cOPM-A1 offers a new portfolio of point solutions for fiber optic test applications. The cOPM-A1 Optical Power Meter is optimized for a number of applications ranging from general lab use to test and process automation for passive optical components.

It can be used with both single-mode and multimode fiber and offers power levels from –80 to +15 dBm over a wavelength range of 800 to 1650 nm.

The cOPM-A1 features high accuracy, high linearity, and extremely low polarization-dependent sensitivity.

Innovative features

Auto dark current

The cOPM-A1 removes the need for manual dark current measurements through innovative analogue circuit design. Typical power meters must be routinely and manually terminated to measure residual current from the photodiode. If this termination is not performed,or performed poorly, significant errors can result for low power measurements. The cOPM-A1 automatically conducts these measurements in the background, which results in zero downtime for a test station and simplifies daily start-up procedures.

TWIN or TRIPLE Test

For Insertion Loss and Return Loss measurements, TWIN or TRIPLE tests dramatically lower test durations up to three times by allowing for the simultaneous measurement of two or three wavelengths. To enable TRIPLE Test, the cOPM-A1 is paired with either the cFPL-A1 Fabry-Perot Light Source or the cORL-A1 Optical Return Loss Meter.

Operating manual update

Continuing enhancement and further development of the Compact Photonic family may mean that this operating manual does not cover all the latest functions of your device.

If the operating instructions about features provided by your device are missing, please visit the JDSU web site to check if additional information is available.

To download the latest operating instructions:

1. Visit the JDSU web site at **www.jdsu.com/test**.
2. Select your model from the product line.
3. Open the download area and download the operating instructions if available.

Symbols used in this operating manual

The following symbols, warnings and character formats are used in this operating manual:

	CAUTION Follow the instructions carefully to avoid **damage** to the device. **WARNING** Follow the instructions carefully to avoid **damage** to the device or **injury** to the person. **DANGER** Follow the instructions carefully to avoid **damage** to the device or **severe injury** to the person.
	High Voltage Follow the instructions carefully to avoid **damage** to the device or **severe injury** to the person. This safety instruction is given if the danger is due to **high voltage**.
	Laser Follow the instructions carefully to avoid **damage** to the device or **severe injury** to the person. This safety instruction is given if the danger is due to **laser radiation**. Information specifying the laser class is also given.
!	**Very important instruction** Follow this instruction carefully; e.g. **!** Make sure you protect yourself and others from exposure to laser light.

✓	**Requirement**
	This requirement must be met first; e.g.
	✓ The system is switched on
⇒ 1. 2.	**Instruction**
	Follow the instructions given (the numbers indicate the order in which the instructions should be followed); e.g.
	⇒ Select mode.
Italics	**Result**
	Indicates the result of following an instruction; e.g.
	The page opens.
Bold type face	**Pages, controls, and display elements**
	Screen pages, controls, and display elements are indicated in **bold type**.
Text in blue	**Cross references**
	Cross references are indicated in blue type. When using the PDF version, just click on the blue text to skip to the cross reference.
[Store]	**Instrument keys**
	Instrument keys are indicated within square brackets.

2 SAFETY INFORMATION

Warning symbols on the unit

⚠️ **Warning symbols indicating a potential hazard**

! In all cases where the unit is labeled with a warning symbol, the operating manual must be consulted to learn more about the nature of the potential hazard and any action that must be taken.

Proper usage

This instrument is intended for measurements on optical fiber devices and systems.

⇒ Please make sure the device is not operated outside the permitted ambient conditions.

⇒ Observe the specified measurement range.

⇒ Always make sure that the device is in proper working order before switching it on.

Laser safety

Dangerous laser radiation

WARNING

Laser radiation can cause irreparable damage to the eye and skin.

The maximum permitted power for the cOPM-A1 means that the optical input signals can reach Hazard Level 4, depending on the device type.

Bear this in mind when using the cOPM-A1.

! Always be aware of the hazard level of the device to be connected.

! Connect all optical fibers before switching on the radiation source.

! Switch off the laser source before disconnecting the optical fibers.

! Never look directly into the output of a laser source or into an optical fiber connected to it.

! Always cover unused ports.

! Heed the normal precautions for working with laser radiation and consider local regulations.

Ventilation

Insufficient ventilation

CAUTION

Insufficient ventilation can damage the device or adversely affect its function and safety.

! Ensure adequate ventilation when operating the device.

SNT-121A Adapter

Safety class

The SNT-121A AC Adapter/Charger Unit is protectively isolated to conform with IEC 60950.

Environmental conditions

⚠️ **CAUTION**	**Ambient temperature too high/low**
	Temperatures outside the operating range of 0 to +40 °C can damage the SNT-121A Adapter or adversely affect its function and safety.

! Only operate the SNT-121A Adapter indoors.
! The SNT-121A Adapter must only be operated at ambient temperatures between 0 and +40 °C.

⚠️ **CAUTION**	**Insufficient ventilation**
	Insufficient ventilation can damage the SNT-121A Adapter or adversely affect its function and safety.

! Ensure adequate ventilation when operating the SNT-121A Adapter.

⚠️ **CAUTION**	**Condensation**
	Operation in the presence of condensation can damage the SNT-121A Adapter or adversely affect its function and safety.

! Do not operate the SNT-121A Adapter if condensation has formed.
! If condensation cannot be avoided, such as when the SNT-121A Adapter is cold and is moved to a warm room, wait until the SNT-121A Adapter Unit is dry before plugging it into the AC power line.

3 GETTING STARTED

Unpacking the device

Packing material

We suggest that you keep the original packing material. It is designed for reuse (unless it is damaged during shipping). Using the original packing material ensures that the device is properly protected during shipping.

Checking the package contents

Your level meter is shipped with the following accessories:
- 1 adapter (BN 2297/00.xx)
- Operating manual
- AC-Adapter SNT-121A

Checking for shipping damage

After you unpack the device, check to see if it has been damaged during shipping. This is particularly likely if the packaging is visibly damaged. If there is damage, do not attempt to operate the device. Doing so can cause further damage. In case of damage, please contact your local JDSU Sales Company. Addresses can be found at **www.jdsu.com.**

Recovery following storage/shipping

Condensation can occur if a device that is stored or shipped at a low temperature is brought into a warm room. To prevent damage, wait until no more condensation is visible on the surface of the device before powering it up. Do not operate the device until it has reached its specified temperature range and wait until it has cooled down if the device was stored at a high temperature (see „Ambient temperature", page 48).

Device overview
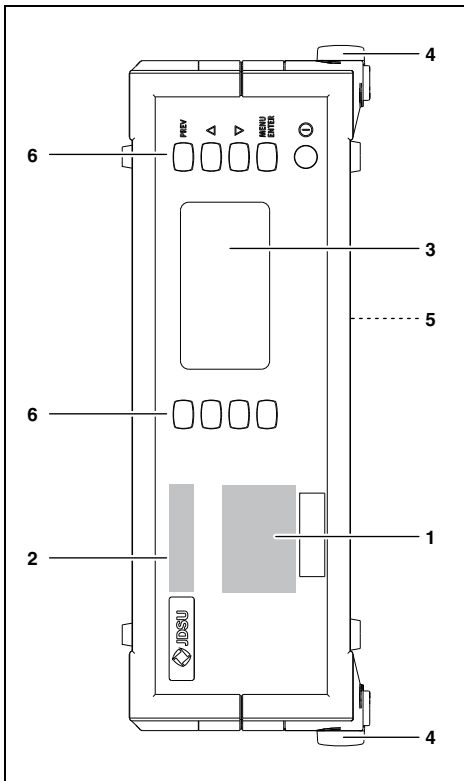
Fig. 1   Frontal view

1	Connector panel (see page 12 for details)
2	Device label
3	Display
4	Stand
5	Power supply connector, USB control interface, reset button (on rear of the device)
6	Keys

λ	Press to select a wavelength.
PREV	Press to go back one menu level (without making any changes).
MENU ENTER	Press to: • open menu and select menu item • store settings
STORE	Press to store displayed values.
dBm/W	Press to toggle level display between dBm and Watt.
dB REF	Press to: • select relative level power measurement • and hold to set the reference level
⏻	Press to switch the device on and off.
△▽	Press to: • scroll up/down in the menus • change values in the menus

Connector panel
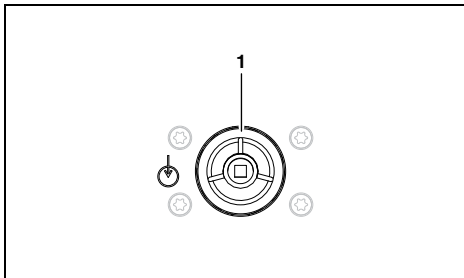
Fig. 2   cOPM-A1 connector panel

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1   Optical connector

Power supply

The following power sources can be used to operate the cOPM-A1:
• the SNT-121A Adapter
• via the USB control interface

Operation from AC power

NOTICE: Only the SNT-121A Adapter must be used to operate the cOPM-A1 from AC power.

To fit the AC line plug adapter:
1. Select the appropriate AC line plug adapter.
2. Slide the AC line plug adapter into the slot.
   The SNT-121A Adapter is ready for use.
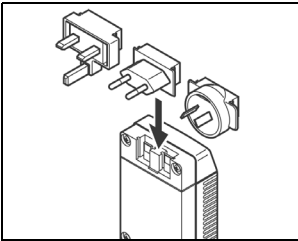
Fig. 3   SNT-121A Adapter.

To change the AC line plug adapter:

1. Place the SNT-121A against the edge of a table or bench as shown (see Fig. 4).
2. Push the SNT-121A downwards.
3. Slide a different AC line plug adapter into the slot (see Fig. 3).
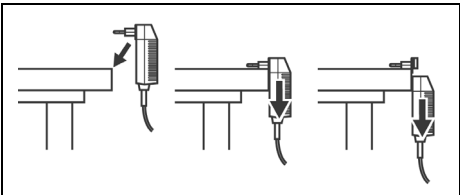
Fig. 4   SNT-121A: Changing the AC line plug adapter.

To operate the cOPM-A1 from AC power:

1. Connect the SNT-121A DC power cord to the cOPM-A1 DC power socket.
   (The socket is located on the back panel.)
2. Plug the SNT-121A into the AC line socket.
   The cOPM-A1 switches on automatically when powered from the SNT-121A.

Operation from USB interface power

Although the USB interface is primarily intended for remote control, it can also be used to power the cOPM-A1.

To power the cOPM-A1 via the USB interface:

⇒ Just connect a standard USB cable to any USB socket of a PC or USB hub.

Notes:

• The device can be operated manually even if it is powered via the USB interface.
• The device will be powered by the SNT-121A Adapter if the SNT-121A Adapter and the USB interface are both connected.

4 BASIC OPERATION

Switching the device on/off

To switch the device on:

⇒ Press **[⏻]** to switch on the device.

To switch the device off:

⇒ Press and hold down **[⏻] for more than 2 sec.** to switch off the device.

Display elements
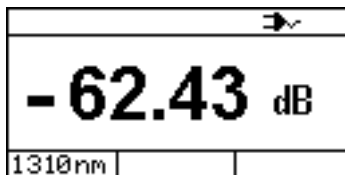
Fig. 5   Measurement display

⊣⊳∿	**External power supply**
	The cOPM-A1 is powered by the external AC adapter when this symbol is shown.
USB	**Power supply via USB**
	The device is powered via the USB interface for remote operation.

1310nm	**Wavelength**
	Display of selected wavelength (displayed wavelength depends on settings and model).
CW Auto-λ	**Signal modulation** • **CW:** Continuous wave • **Auto-λ:** Auto wavelength detection • **270 Hz, 1 kHz, 2 kHz**: modulation frequency
Center of display	Shows the measurement results or setup values.

Navigating in the menus

✓ The measurement display is shown.

⇒ Press **[MENU ENTER]** to open the MAIN menu.
 The MAIN *menu opens.*

To select a menu item:

1. Press **[▲▼]** to highlight an item.
2. Press **[MENU ENTER]** to select the item.

To leave a menu without making any changes:

⇒ Press **[PREV]**.

Configuring the device

This chapter describes the basic settings in the Configuration menu.

Configuration menu overview

✓ The measurement display is open.

⇒ Press **[MENU ENTER]** to open the MAIN menu and select **Configuration.**
 The CONFIGURATION *menu opens:*

```
MENU: CONFIGURATION
Edit Date           ++
Edit Time
Firmware Update
Select Language
```

```
MENU: CONFIGURATION
Edit λ-Table
Select Auto λ
Edit Contrast
Set Factory Default
Show Info            ++
```
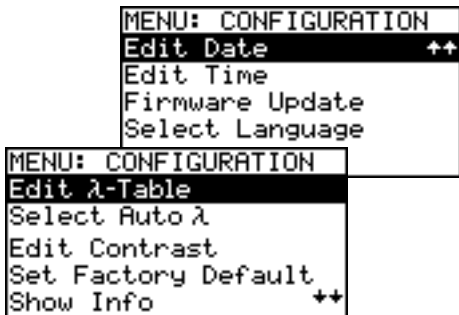
The following table gives a short overview of the menu items. These are explained in the sections below.

Edit λ-Table	Edit the wavelengths in the table and the view status (show/hide) of each entry.
Select Auto-λ	Activate/deactivate "Automatic Wavelength Detection".
Edit Contrast	Adjust display contrast.
Set Factory Default	Set the device parameters and settings to their default values as defined by JDSU. This does not affect any stored measurement results.

Show Info	Display basic device information.
Edit Date	Adjust date.
Edit Time	Adjust time.
Firmware Update	Download the current device firmware version from the internet to the device.
Select Language	Select the language of the device texts.

Editing the Lambda-Table

The wavelength table (λ-Table) supports the definition of up to 30 wavelengths. The wavelengths with the attribute "shown" form a set of wavelengths which will be rotated through when the **[**λ**]** key is pressed.

The remaining wavelengths are "hidden".

E.g. if only two wavelengths have the attribute "shown", you can toggle between them with a single keystroke.

To edit the λ-Table:

1. Press **Edit λ-Table** in the CONFIGURATION menu.
   The EDIT λ-TABLE *menu opens (displayed wavelengths may vary according to model and settings).*

```
MENU: EDIT λ-TABLE
1530nm     hidden    ++
1550nm     shown
1570nm     hidden
1590nm     shown
1607nm     shown     ++
```

2. Highlight the entry to be edited and press
   [MENU ENTER].
   A window opens:

```
MENU: EDIT λ-TABLE
Edit
Show
Hide

                    1550nm
```
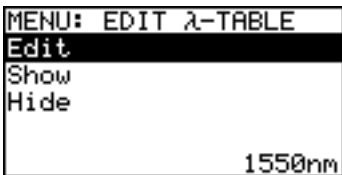
3. Press **[MENU ENTER]** again to edit the selected wavelength (**Edit** is already selected).
   The value to be edited is displayed:

```
MENU: EDIT λ-TABLE


1550nm
```
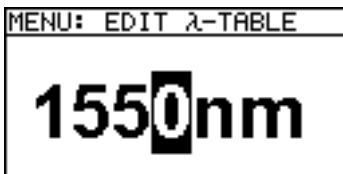
4. Press **[▲▼]** to change the value:
   - Press once to change one step at a time.
   - Hold down the key to increase the step change rate.
5. Press **[MENU ENTER]** to set the new wavelength.
   The EDIT λ-TABLE window is displayed again.
6. Press **[MENU ENTER]** again to change the view status.
7. Select **Show** to show the wavelength in the table
   – or –
   Select **Hide** to hide the wavelength in the table.
8. Press **[MENU ENTER]** to confirm the selection.

Repeat steps 2 through 7 as required.

Enabling Auto-Lambda mode

Auto-λ is a special feature developed by JDSU that allows you to identify wavelengths automatically. To do this, the signal is modulated at a certain frequency (by a light source equipped with Auto-λ, such as a JDSU OLS-55/-56), which can be detected by a JDSU cOPM-A1.

Wavelengths cannot be reliably detected if:
- the receive level is too low,
- wavelength encoding cannot be detected due to interference
- you are measuring the absolute level of a system that does not have wavelength encoding that matches JDSU power sources.

To switch Auto-λ mode on/off:

1. Select **Select Auto-λ** in the CONFIGURATION menu.
   The AUTO-λ *menu is displayed.*

```
MENU: AUTO-λ
DISABLE
ENABLE
```
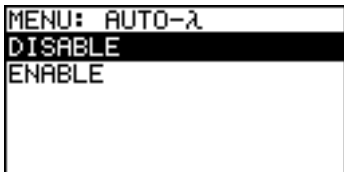
2. Select **ENABLE** to switch on Auto-λ
   – or –

   Select **DISABLE** to switch off Auto-λ.

3. Press **[MENU ENTER]** to confirm the setting.
   If Auto-λ mode is activated and a laser source supporting Auto-λ is connected, Auto-λ will be displayed in the bottom center display pane.

Display in Auto-λ mode

When **Auto-λ** mode is activated and different wavelengths are detected, the power levels measured at these wavelengths are displayed simultaneously.

```
                         USB
1310nm    -3.03dBm
1550nm    -3.00dBm
1625nm    -3.00dBm
          Auto λ    PERM
```

Fig. 6 Display in **Auto**-λ mode showing the detected wavelengths and their power levels.

Setting the display contrast

1. Select **Edit Contrast** in the CONFIGURATION menu.
   The CONTRAST menu opens:

```
MENU: CONTRAST
Press arrow
UP  :  to increase
DOWN:  to decrease
```

2. Press **[▲▼]** to increase/decrease the contrast.
3. Press **[MENU ENTER]** to store the value and exit from the menu.

Setting the factory default values

1. Select **Set Factory Default** in the CONFIGURATION menu.
   The FACTORY DEFAULT menu opens:

```
MENU: FACTORY DEFAULT

ENTER: to confirm
ANY KEY: to quit
```

2. Press **[MENU ENTER]** to set the factory defaults.
   – or –
   Press any key to exit from the menu without making any changes.

Note: Setting the factory default values does not affect your stored measurement results.

Displaying device information

⇒ Select **Show Info** in the CONFIGURATION menu.
The INFO menu opens and basic device information is shown: device name, family, serial number, calibration date, software version, battery type and, if applicable, date and time.

Setting the date and time

1. Select **Edit date** in the CONFIGURATION menu.
   The EDIT DATE MENU opens:

```
MENU: EDIT DATE


     yyyy/mm /dd
     2007/NOV/27
```

2. Press **[▲▼]** to set year and press **[MENU ENTER]**.
3. Press **[▲▼]** to set month and press **[MENU ENTER]**.
4. Press **[▲▼]** to set day and press **[MENU ENTER]**.
5. Select **Edit time** in the CONFIGURATION menu.
   The EDIT TIME menu opens.
6. Press **[▲▼]** to set hours and press **[MENU ENTER]**.
7. Press **[▲▼]** to set minutes and press **[MENU ENTER]**.
8. Press **[▲▼]** to set seconds and press **[MENU ENTER]**.

Note: The date and time will need to be set again if the device is without any power for more than 1 hour.

The device is without any power if

- neither the SNT-121A Adapter is connected,
- nor a USB connection is established and
- no batteries are fitted or the batteries are discharged.

Updating the firmware

The latest version of the firmware can be downloaded from the internet at any time and stored in the EEPROM.

To find the latest firmware version:

1. Visit the JDSU web site at **www.jdsu.com/ test_and_measurement**.
2. Select your model from the product line.
3. Open the download area and download the latest firmware.

You will also find step-by-step instructions on how to update the firmware there.

After downloading the firmware to your PC follow the steps below to install the firmware into your device.

To install the firmware into the device:

1. Select **Firmware Update** in the CONFIGURATION menu.
   The FIRMWARE UPDATE menu opens:

```
MENU: FIRMWARE UPDATE
       Updates at
  http://www.jdsu.com

PREV : to cancel
                     ++
```
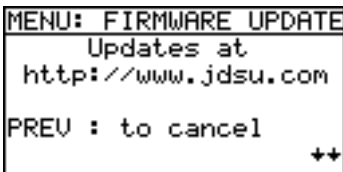
2. Press **[▼]** to open the next window.
   – or –
   Press **[PREV]** to cancel.

```
MENU: FIRMWARE UPDATE
                     ++
Press ENTER to start

! Remove all power  !
! sources to stop   !
```
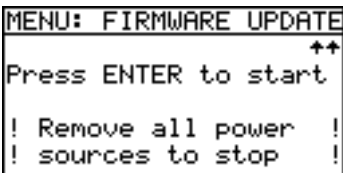
3. Press **[MENU ENTER]** to start the update.
   – or –
   Press **[PREV]** to cancel.

4. Connect the device to the PC via the USB interface.

Note: Once the update has been started it cannot be stopped by pressing any of the keys.
To stop the update you must disconnect the device from all power sources (adapter/charger, batteries, USB connection).

Selecting a language

1. Select **Select Language** in the CONFIGURATION menu.
   The SELECT LANGUAGE menu opens:

```
MENU: SELECT LANGUAGE
English
Deutsch
Français

```
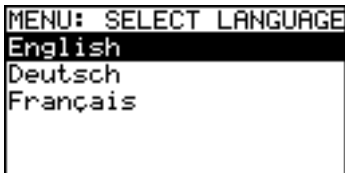
2. Press **[▲▼]** to highlight the language you want and press **[MENU ENTER]** to select it.

5 OPERATION

Selecting a wavelength

The sensitivity of the photo diode depends on the
wavelength. The wavelength setting of the device must
match the wavelength of the incoming signal to ensure a
correct reading.

To select a wavelength:

⇒ Press **[λ]** to select a new wavelength.
The value is shown in the lower left display pane:
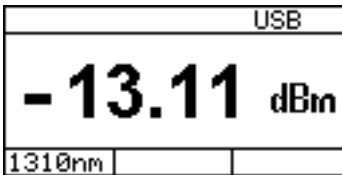
↑ selected wavelength

The wavelengths that can be selected by pressing this
key are an extract of those contained in the internal
wavelength table (λ-Table).

Note: See for
details of how to edit this table.

Displaying absolute power level

The power level is displayed in dBm or Watts (nW, µW, mW) in absolute power level display mode.

⇒ Press **[dBm/W]** to display absolute power level and to toggle between dBm or Watts.
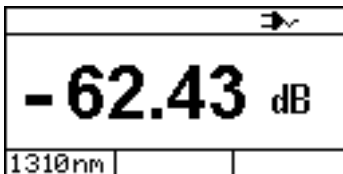
Fig. 7   Displaying absolute power level in dBm.

Displaying relative power level

The actual measured power level relative to a reference value is displayed in relative power display mode. The reference value can be set by defining the actual power level as the reference value. This setting can then be edited manually.

Setting the reference level

✓ The device is in absolute power level display mode.
1. Press and hold **[dB REF]** to set the reference level.
   The actual power level is set as the new reference level. The reference level is displayed in the top display bar. Reference power level display mode is activated.

Note: The reference level must be stored for each wavelength separately and is saved even when the power is off.

Editing the reference level

The reference level can be also edited manually.
1. Select **Edit Ref. Level** in the MAIN menu.

The measurement display opens, showing EDIT in the top right corner.


```
REF: -10.10dBm        EDIT

    -49.50 dB

1310nm              PERM
```
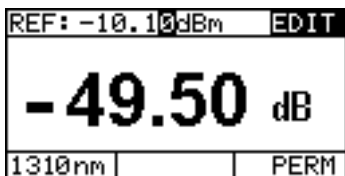
2. Press **[▲▼]** to change the value.
3. Press **[MENU ENTER]** to accept the setting.

Displaying modulated signals

The cOPM-A1 automatically detects the modulation frequency of light signals modulated at the fixed frequencies of 270 Hz, 1 kHz and 2 kHz.The detected frequency is shown in the lower center display pane.



```
                      ➪⌄

    -62.43 dBm

1310nm   270 Hz
```
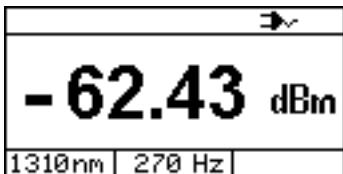
Fig. 8   Detection of modulated light, e.g. 270 Hz.

6 MEMORY MANAGEMENT

General information

The cOPM-A1 allows you to save the measured power level values in a structured data memory and recall them as required. Up to 350 results can be stored. All data is saved to a non-volatile memory (E^2PROM).

Data can also be downloaded via the USB interface to a PC for further evaluation.

Two methods of recording values are available to meet individual requirements:

- Measured values stored in successive memory locations.
- Measured values stored in pre-defined memory locations.

Result memory structure

The cOPM-A1 is equipped with a data memory which is structured according to the typical device under test, i.e. a cable made up from several fibers. This hierarchical structure predetermines the memory locations which generally contain the following data:

- **Group** number: 001 to 350
- **Meas**(urement) number: 001 to 350
- **Wavelength**

A combination of these three values is assigned to each memory location, each value being accessible separately.

Saving results successively

Results are stored simply by pressing **[Store]**. Each time the key is pressed, the next memory location will be used to store the current result. If the memory is initially empty, the memory starts with Group 001 and Meas 001. The Meas # then increments each time **[Store]** is pressed (up to a maximum of 350).

This method is ideal for simple measurement sequences, e.g. when a limited number of power level values for a **single** item under test are to be recorded.

To save current results successively:

✓ The entire result memory is empty or the first and subsequent memory locations are empty.

✓ The device is in measure mode.

1. Press **[Store]** to save the first result.
   The display briefly indicates the first memory location, e.g. Group 033, Meas 001. "STORING ..." confirms the storing process is successful.

```
GROUP: 001  MEAS:   001

        STORING...
```
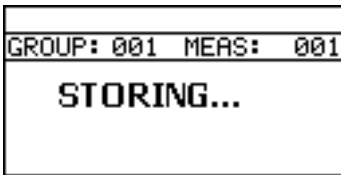
2. Press **[Store]** again every time you want to save a further result value.
   The display briefly shows the memory location used. The Meas # increments each time.

If the results are to be stored starting from a different memory location, such as Group 015, Meas 005, these values must be specified in advance (see „Selecting the store location", page 32).

If you attempt to store data at memory locations that are already occupied by the results of previous measurements, a warning will be displayed:

Fig. 9   Display if selected memory location is already occupied.

⇒ Press **[MENU ENTER]** to overwrite the old data with new data.
⇒ Press **[PREV]** if you do not want to overwrite the old data.

Displaying stored results

Displaying the last measurement results stored is probably the function you will use the most often. For this reason, the last memory location used will be displayed when you enter the MANAGE MEMORY menu. The Meas # is highlighted by default so you have quick access to all the measurements of a certain Group.

To display the last results stored:

⇒ Select **Manage Memory** in the MAIN menu.
   The last results stored are displayed.
   Stored results example: Group 025, Meas 004:
   3 wavelengths detected, relative measurement mode
   with measured levels and reference values.

To select another Measurement in the current Group:
⇒ Press **[▲▼]** to increase/decrease the Meas #.

```
2007/JUL/18 15:47:34
GROUP: 001 MEAS:   002
λ/nm|Lev/dB  |Ref/dBm
1550|LOW     | -50.00
1490|LOW     | -50.00
1310|LOW     |  +0.00
```

To select another Group and Measurement:

1. Press **[MENU ENTER]**.
   The MANAGE MEMORY menu opens:

```
MENU: MANAGE MEMORY
Select Group
Clear Actual Meas
Clear Group
Clear All
GROUP: 001 MEAS:   002
```

2. Press **[MENU ENTER]** again (**Select Group** is selected).
   The current Group and Meas 001 will be displayed:

```
2007/JUL/18 15:47:34
GROUP: 001 MEAS:   002
λ/nm|Lev/dB  |Ref/dBm
1550|LOW     | -50.00
1490|LOW     | -50.00
1310|LOW     |  +0.00
```

3. Press **[▲▼]** to increase/decrease the Group #.
4. Press **[MENU ENTER]**.
   MEAS # will be highlighted.
5. Press **[▲▼]** to increase/decrease the Meas #.

⇒ Press **[MENU ENTER]** to exit from the menu.

Selecting the store location

When you press **[Store]** in measurement mode, the results are stored at the active memory location. Each time you press the key, the Meas # is incremented but the Group # remains the same. You cannot select the memory location, Meas # or Group # in measurement mode.

If you do not want to overwrite existing data or if you want to set a specific Group and Meas number, you must open the MANAGE MEMORY menu and select the location.

The procedure is the same as for displaying a memory location (see "Displaying stored results", page 30), as the last memory location displayed is always set as the current memory location when storing data.

To save results at a selected location:

1. Set the wavelength and measurement mode as required.
2. Select **Manage Memory** in the MAIN menu.
3. Press **[▲▼]** to edit the Meas # only.
   Go to step 9 if you only want to edit the Meas #.
4. Press **[MENU ENTER]**.
   The MANAGE MEMORY menu opens.
5. Press **[MENU ENTER]** again (**Select Group** is highlighted).
   The current Group # and Meas 001 are displayed.
6. Press **[▲▼]** to edit the Group #.
7. Press **[MENU ENTER]**.
   Meas # is highlighted.
8. Press **[▲▼]** to edit the Meas #.
9. Press **[PREV]** to exit from the menu.
⇒ Press **[Store]** to store the results.

Clearing the memory

You can store up to 350 data sets in the cOPM-A1. Each data set can contain up to 3 measurements in Auto λ mode (in conjunction with a JDSU OLS-55 light source). Each data set contains the wavelength, the relative power level and reference value or the absolute power level, and the date / time when it was stored.

You do not have to clear the entire memory to free up capacity. You can clear individual Meas or Group locations to provide access to specific Meas or Group numbers.

The cOPM-A1 has the following memory clear functions:

- **Clear Actual Meas**
  Clears the data of the selected measurement
- **Clear Group**
  Clears all the measurements of the selected Group
- **Clear All**
  Clears all the data in the memory.

Clearing memory data

1. Select **Manage Memory** in the MAIN menu.
   The last results stored are displayed.
2. Press **[MENU ENTER]**.
   The MANAGE MEMORY menu opens:

```
MENU: MANAGE MEMORY
Select Group
Clear Actual Meas
Clear Group
Clear All
GROUP: 001 MEAS:   002
```

To clear the data from a current measurement:

1. Set the Group # and Meas # of the data you want to clear.
2. Press **[▲▼]** to select **Clear Actual Meas**.
3. Press **[MENU ENTER]** to clear the selected Measurement data.

4. Press **[PREV]** to exit from the menu.

Note: If you now store results, they will be stored at the memory location for the cleared Meas # of the last Group displayed.

To clear all the data of a Group:

1. Set the Group # that you want to clear.
2. Press **[▲▼]** to select **Clear Group**.
3. Press **[MENU ENTER]** to clear all the Meas data for the selected Group #.
4. Press **[PREV]** to exit from the menu.

Note: If you now store results, they will be stored at memory location Meas 001 of the last Group displayed.

To clear the entire memory:

1. Press **[▲▼]** to select **Clear All**.
2. Press **[MENU ENTER]** to clear all memory data.
3. Press **[PREV]** to exit the menu.

Note: If you now store results, they will be stored at memory location Group 001 and Meas 001.

7 MAINTENANCE

Dangerous voltage and invisible laser radiation

Maintenance or cleaning of the device when it is connected up or operating may damage the device or injure you.

WARNING

! Make sure that the device is switched off and disconnected from all power sources and optical radiation sources before maintenance or cleaning.

Cleaning the test port

It is a good idea to check that the optical connections are clean and to clean them if necessary before starting measurements. Even very small dust particles on the end surfaces of the plugs can adversely affect the accuracy of the measurement.

Damage to the photo diode

The surface of the photo diode is freely accessible when the adapter is unmounted. Touching the photo diode could scratch the glass surface.

CAUTION

! Be careful when cleaning the photo diode and do not use any rough cleaning materials.

1. Switch off the device.
2. Remove the test adapter from the optical connection. *The plug end surface is now accessible.*
3. Wipe off the plug end surface using cleaning sticks soaked in isopropanol. This cleaning method is very effective and leaves no residues.
4. Blow out the test adapter with clean compressed air (available in spray cans, e.g. Anti Dust Spray).

Note: Cover the optical connections with the dust cap whenever they are not in use. This prevents them from getting dirty.

Cleaning the instrument

If the instrument gets dirty through use, you can clean it using a soft cloth moistened with a mild solution of detergent.

	Water and cleaning fluids
⚠️ **CAUTION**	**The device may be damaged or destroyed if water or cleaning fluids get inside it.** **!** Make sure that water or cleaning fluids do not get inside the instrument.

8 REMOTE CONTROL

Communication interface

The cOPM-A1 is equipped with a USB interface for remote control via a PC. The driver files needed on the PC for this can be download from **www.jdsu.com/test_and_measurement**.

Key

The following table lists the parameter types used in remote control.

<NR1>	Integer value. Examples: 23, 90, 0
<NR2>	Real number. Examples: 23.45, 1.30
<NR3>	Exponential number. Examples: 4.3E-3, -8.9456E8, 123E-5
<NRf>	<NR1> | <NR2> | <NR3>
<BOOLEAN>	Boolean value. Examples: 0, 1, OFF, ON
<MNEMONIC>	Short form. The valid short forms are listed with the corresponding commands.
<STRING_RESPONSE_DATA>	IEEE4888.2, 8.7.1

Commands

The commands are sorted according to their function (not alphabetically). This sort order reflects a fairly standard application of the device.

Overview

Utility commands

*IDN?
*OPC?
:SYST:PERM:POW
:DISP:CONT
:DISP:CONT?

:SYST:LANG
:SYST:LANG?
:SYST:DATE
:SYST:DATE?
:SYST:TIME
:SYST:TIME?

Power Metercommands

:SYST:CAL:WAV:MAX?
:SYST:CAL:WAV:MIN?
:SYST:CAL:WAV:TAB
:SYST:CAL:WAV:TAB?
:SYST:CAL:WAV
:SYST:CAL:WAV?
:DISP:UNIT
:DISP:UNIT?
:REF:STAT
:REF:STAT?
:REF:VAL
:REF:VAL?
:WAV:AUTO

:WAV:AUTO?
:FETC:AM:AUTO:FREQ?
:FETC:AM:INT:FREQ?

Memory Management commands

:MEM:FREE?
:MEM:USED?
:MEM:GROU
:MEM:GROU?
:MEM:GROU:MEAS
:MEM:GROU:MEAS?
:MEM:ID:MEAS?
:MEM:STOR:MEAS
:MEM:REC:MEAS?
:MEM:REC:ALL?
:MEM:DEL:MEAS
:MEM:DEL:GROU
:MEM:DEL:ALL

Utility commands

Command string	Parameter type / Response type / Unit / Info
*IDN?	Returns the unique identification of the device. **Response type:** <STRING_RESPONSE_DATA> e.g. JDSU Germany GmbH, cOPM-A1/01,A-0106,V03.30
*OPC?	Returns "1" as soon as all operations in progress have been completed.
:SYST :PERM :POW	Ensures the device is switched on permanently i.e. that it does not switch off after 20 minutes.

Command string	Parameter type / Response type / Unit / Info
:DISP :CONT	Sets the display contrast. **Parameter type:** <NR1> Range: 0...15 (0: min, 15: max.)
:DISP :CONT?	Returns the display contrast. Range: 0...15 (0: min, 15: max.)
:SYST :ERR?	Returns the oldest error in the error queue. **Response type:** <NR1>, <STRING_RESPONSE_DATA> e.g. -100,"Command error"
:SYST :DEV :DEF	Sets the device parameters to their default values.
:SYST :LANG	Sets the language. **Parameter type:** <MNEMONIC> • EN: English • DE: German • FR: French
:SYST :LANG?	Returns the current language. EN or DE or FR
:SYST :DATE	Sets the date (yy,mm,dd). e.g. :SYST:DATE 07,11,30
:SYST :DATE?	Returns the date (yy,mm,dd). e.g. 07,11,30
:SYST :TIME	Sets the time (hh,mm,ss). e.g. :SYST:TIME 23,59,59

Command string	Parameter type / Response type / Unit / Info
:SYST :TIME?	Returns the time (hh,mm,ss). e.g. 23,59,59

Power Meter commands

Command string	Parameter type / Response type / Unit / Info
:SYST :CAL :WAV :MAX?	Returns the maximum wavelength that can be set. e.g. 1650
:SYST :CAL :WAV :MIN?	Returns the minimum wavelength that can be set. e.g. 780
:SYST :CAL :WAV :TAB	Sets up to 30 wavelengths in the λ-Table. **Parameter type:** <NR1,NR1,...> e.g. :SYST:CAL:WAV:TAB 820,850, 980,1280,1300,1310,1480,1510, 1550,1625
:SYST :CAL :WAV :TAB?	Returns the contents of the λ-Table. **Response type:** <NR1,NR1,...>
:SYST :CAL :WAV	Selects the calibration wavelength from the λ-Table. See :SYST:CAL:WAV:TAB? for more details. **Parameter type:** <NR1> e.g. :SYST:CAL:WAV 1310

Command string	Parameter type / Response type / Unit / Info
:SYST :CAL :WAV?	Returns the calibration wavelength currently used by the instrument. e.g. 1310
:DISP :UNIT	Selects how the power level is displayed. **Parameter type:** <MNEMONIC> • LIN: linear display of power level (μW) • LOG: logarithmic display of power level (dBm or dB)
:DISP :UNIT?	Returns the power level display type: LIN or LOG
:REF :STAT	Determines whether the power level reading is displayed as an absolute or a relative value. **Parameter type:** <BOOLEAN> • 0: absolute value (μW or dBm) • 1: relative value (dB) Default setting: 0
:REF :STAT?	Returns the type of power level display. **Response type:** <BOOLEAN> • 0: absolute value • 1: relative value
:REF :VAL	Sets the value for the specified wavelength (to which the power level reading is referred) in relative mode. **Parameter type:** <NR1>,<NRf> e.g. :REF:VAL 1310,-34.50 sets the reference value for 1310 nm to -34.50 dBm.

Command string	Parameter type / Response type / Unit / Info
:REF :VAL?	Returns the value for the specified wavelength (to which the power level reading is referred) in relative mode. **Parameter type:** <NR1> **Response type:** <NRf> **Unit:** dBm e.g. :REF:VAL? 1490
:WAV :AUTO	Determines whether device recognizes Auto λ modulation frequencies which automatically sets the system calibration wavelengths. **Parameter type:** <BOOLEAN> • 0: Auto-λ recognition off • 1: Auto-λ recognition on Default setting: 0
:WAV :AUTO?	Returns whether Auto-λ recognition is on or off. • 0: Auto-λ recognition off • 1: Auto-λ recognition on
:FETC :AM :AUTO :FREQ?	Returns • "1", if an Auto-λ modulation frequency was detected on the incoming signal. • "0" otherwise
:FETC :AM :INT :FREQ?	Returns • "0", if the incoming signal is not modulated or Auto-λ modulation frequency is detected. • the modulation frequency [Hz] otherwise **Response type:** <NR1>

Command string	Parameter type / Response type / Unit / Info
:FETC :MEAS :VAL?	Returns up to 3 power levels measured at the input port of the device (depends on the number of wavelengths displayed simultaneously. **Response type:** <NR3,NR3,NR3> **Response unit:** Absolute display (:REF:STAT 0) • in dBm for DISP:UNIT LOG • in W for DISP:UNIT LIN Relative display (REF:STAT 1) in dB • +9.91E37 overflow • −9.91E37 underflow

Memory Management commands

Command string	Parameter type / Response type / Unit / Info
:MEM :FREE?	Returns number of how many measurements can still be stored until memory is full.
:MEM :USED?	Returns number of measurements stored.
:MEM :GROU	Selects the group (1...350) where the measurement is stored, deleted or recalled. **Parameter type:** <NR1> e.g. :MEM:GROU 10
:MEM :GROU?	Returns the group where the measurement is stored, deleted or recalled. e.g. 10

Command string	Parameter type / Response type / Unit / Info
:MEM :GROU :MEAS	Sets the measurement number (1...350) in the current group where the measurement is stored, deleted or recalled. **Parameter type:** <NR1> e.g. :MEM:GROU:MEAS 25
:MEM :GROU :MEAS?	Returns the measurement number in the current group where the measurement is stored, deleted or recalled. e.g. 25
:MEM :ID :MEAS?	Returns the current group and measurement number where the measurement is stored, deleted or recalled. e.g. 10,25
:MEM :STOR :MEAS	Stores the current measurement under the current measurement group and number. **Note:** If this command is repeated immediately (i.e. with no other commands, such as :MEM:REC:MEAS? in between), the identifier increments by 1 for the next store operation.

Command string	Parameter type / Response type / Unit / Info
:MEM :REC :MEAS?	Returns the measurement stored in the memory at the current group/ meas value. **Format for measurement:** group, meas; date, time; measdata[; measdata] **Format of measdata:** wavelength, level, reference e.g. 1,6;2007/AUG/31;23:59:59; 1490nm,-45.69dB,-5.12dBm; 1550nm,-12.34dB,-10.00dBm
:MEM :REC :ALL?	Returns all the measurements stored in the memory. Format for each measurement: see :MEM:REC:MEAS?
:MEM :DEL :MEAS	Deletes the current measurement.
:MEM :DEL :GROU	Deletes all measurements in the specified group (1...350). e.g. :MEM:DEL:GROU 20
:MEM :DEL :ALL	Deletes all measurement results from the memory.

9 SPECIFICATIONS

General specifications

Sensor element	InGaAs
Wavelength range	800 to 1650 nm
Power range	−80 to +15 dBm
Display resolution	0.01 dB/0.001 µW
Fibre type	SMF and MMF with N/A <0.27
Maximum core diameter	62.5 µm
Uncertainty at reference condition[1]	±3%
Linearity at reference condition[2]	±0.06 dB ±20 pW
Averaging time	25 ms
Recalibration period	1 year
Warm-up time	15 min

1) Reference condition: −20 dBm (CW), 1310 ±1 nm, 23 ±3°C, to 75% RH, 9 to 50 µm

Display

Display type	Graphical display, 64 x 128 pixels, monochrome,

Memory

Memory capacity	1000 measurement results, 350 data sets
Data readout / remote control	via USB interface (INF file for Windows XP included)

Power supply

AC line operation	with separate SNT-121A Adapter
USB	Direct from USB, no SNT-121A Adapter required
Power consumption[1]	0.4 W

1) When connected to the AC power plug

Ambient temperature

Nominal range of use	-10 to +55 °C

Air humidity

Humidity	Non-condensing

Dimensions and weight

Dimensions (w x h x d)	250 x 88 x 210 mm
Weight	1.6 kg

Integrating sphere specifications

Attenuation at reference[1]	–30.7 ±0.8 dB
Spectral range	800 to 1650 nm
Wavelength flatness[2]	< ±1.5 dB
RL[3]	> 65 dB (typical)
Relative uncertainty[4]	< ±0.05 dB
Residual polarization dependent loss (PDL)[5]	< 0.005 dB
Maximum power[6]	+33 dBm (2 W)
Operating temperature	10 to 40°C, RH 15 to 70%
Storage temperature	–30 to 60°C, RH 15 to 95% non-condensing

1) Measured with wavelength of 1550 nm at 23 ±5°C and RH = 50% with straight connector
2) From 850 to 1650 nm, refer to the wavelength of 1310 nm
3) Measured at 1310 and 1550 nm with SM fiber and FC/APC connector
4) At reference condition, with 8 degree angled connector, due to the polarization and interference
5) Measured at 1550 nm
6) Continuous Wave (CW) laser

SNT-121A Adapter

Power supply type	FW 75550/12
Nominal line voltage range	100 to 240 VAC
Nominal line frequency range	47 to 63 Hz
Power consumption	max. 8.5 W
Output	12 V ⎓ / 1.25 A
Temperature range	0 to +40°C

Condensation – even occasional – is not tolerable.

10 ORDERING INFORMATION

cOPM-A1, Power meter with InGaAs Diode	**BN 2297/02**

Calibration report	BN 2297/90.01

Accessories

2 mm InGaAs MAP Power Meter

AC101	FC detector adapter	2297/00.01
AC103	SC detector adapter	2297/00.03

On Request

AC100	AC100 Detector cap
AC102	ST detector adapter
AC112	MT ribbon cable adapter
AC114	MU detector adapter
AC115	E2000 detector adapter
AC120	Magnetic fiber holder (requires AC121)
AC121	Single bare fiber plug (requires AC120)
AC330	+33 dBm integrating sphere

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JDSU Environmental Management Program

Superb performance and high quality have always characterized JDSU datacom and telecom measurement technology products. In this same world-class tradition, JDSU has an established, proactive program of environmental management.

Environmental management is an integral part of JDSU's business philosophy and strategy requiring the development of long-term, productive solutions to problems in the key areas of economics, technology, and ecology.

A systematic environmental management program at JDSU is essential in regard to environmental policy and enhances cooperation between ourselves and our business partners.

The JDSU Environmental Management Program considers:

Product design and manufacture
Environmental restrictions and requirements are taken into account during planning and manufacture of JDSU products. This attention ranges form the raw materials and finished components selected for use and the manufacturing processes employed, through to the use of energy in the factory, and right on up to the final stages in the life of a product, including dismantling.

Hazardous materials
JDSU avoids or uses with care any hazardous or dangerous material in themanufacturing process or the end product. If the use of a dangerous material cannot be avoided, it is identified in product documentation and clearly labeled on the product itself.

Packaging materials
Preference is given to reusable or biodegradable single-substance packaging materials whenever possible.

Environmental management partnerships
JDSU encourages our customers and suppliers who take this responsibility seriously to join JDSU in establishing their own environmental management programs.

Recycling used products
This product complies with the European Union Waste Electrical and Electronic Equipment directive (WEEE), 2002/96/EC. This product should not be disposed of as unsorted municipal waste and should be collected separately and disposed according to your national regulations.

In the European Union, all equipment purchased from JDSU after 2005-08-13 can be returned for disposal at the end of its useful life. Measuring systems affected by this can be recognized by the symbol on the right of a crossed-out trash can and a black bar. This symbol can be found either on the device or in the accompanying documents.

Contact your local Technical Assistance Center (TAC) for return and collection services available to you.If you would like specific information about the JDSU Environmental Management Program, please contact us at:

If you would like specific information about the JDSU Environmental Management Program, please contact us at **www.jdsu.com/test**

The following pages provide with respect to Chinese Requirements information with regard to the location of restricted hazardous substances within this equipment.
As measuring equipment this equipment is excluded from the European regulations for the restriction of hazardous substances (RoHS).

"中国RoHS"

《电子信息产品污染控制管理办法》（信息产业部，第39号）

附录 (Additional Information required for the Chinese Market only)

本附录按照"中国RoHS"的要求说明了有关电子信息产品环保使用期限的情况，并列出了产品中含有的有毒、有害物质的种类和所在部件。本附录适用于产品主体和所有配件。

环保使用期限：

本标识标注于产品主体之上，表明该产品或其配件含有毒、有害物质（详情见下表）。

其中的数字代表在正常操作条件下至少在产品生产之日期之后数年内该产品或其配件内含有的有毒、有害物质不会变异或泄漏。该期限不适用于诸如电池等易耗品。

有关正常操作条件，请参见产品用户手册。

产品生产日期请参见产品的原始核准证书。

有毒、有害物质的类型和所在部件

元器件 (Component)	有毒、有害物质和元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
产品主体 (Main Product)						
印刷电路板组件 (PCB Assemblies)	X	O	O	O	O	O
内部配线 (Internal wiring)	O	O	O	O	O	O
显示器 (Display)	O	O	O	O	O	O
键盘 (Keyboard)	O	O	O	O	O	O
塑料外壳零件 (Plastic case parts)	O	O	O	O	O	O
配件 (Accessories)	O	O	O	O	O	O

O：代表该部分中所有均质材料含有的该有毒、有害物质含量低于SJ/T11363-2006标准的限值。
X：代表该部分中所有均质材料含有的该有毒、有害物质含量高于SJ/T11363-2006标准的限值。