

# LECROY

## CDR-0125 OPTICAL CLOCK RECOVERY MODULE



## OPERATOR'S MANUAL

MAY 2006



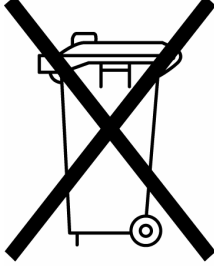
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CDR-O125-OM-E Rev A  
913774-00 Rev A

# Operator's Manual

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# CDR-O125 Optical Clock Recovery Module

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## SAFETY REQUIREMENTS

This symbol may appear on the product: 

It refers you to additional information contained in the *Operator's Manual*. The corresponding information in this manual is similarly denoted.

Before using this product, ensure that its operating environment will be maintained within these parameters:

**Temperature:** 5 to 40 °C

**Humidity:** ≤ 80% RH (non-condensing)

**Altitude:** Up to 2000 m (6561 ft)



### CAUTION

To avoid personal injury or damage to the CDR-O125 or any equipment connected to it, review and comply with the following safety precautions.

- **Use only as intended.** The CDR-O125 hardware is intended to be used only with the LeCroy oscilloscope. Use of the CDR-O125 and/or the equipment it is connected to in a manner other than specified may impair the protection mechanisms.
- **Do not apply any potential to the input that exceeds the maximum ratings of the product (refer to specifications section).**
- **Connect and disconnect properly.** Avoid damage to cables thru excessive bending.
- **Do not use in wet/damp or explosive atmospheres.**
- **For indoor use only.** The CDR-O125 is intended for indoor use and should be operated in a clean, dry, environment.
- **Do not operate with suspected failures.** Do not use the CDR-O125 if any part is damaged. All maintenance should be referred to qualified service personnel.
- **Keep product surfaces clean and dry.**

### Cleaning

The outside of the CDR-O125 hardware should be cleaned with a soft cloth dampened with either deionized/distilled water or isopropyl alcohol. Allow the surface to dry completely before returning the CDR-O125 to service.

# CDR-O125 Optical Clock Recovery Module

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The optical connectors can be accessed by removing the ferrule from the connector. The fiber ends should be cleaned with isopropyl alcohol and lens paper. Keep the ends of all optical fiber cables connected to the unit clean, using isopropyl alcohol or a suitable optical fiber cleaning kit.

## Use and Maintenance

The CDR-O125 is a high-quality precision instrument. To maintain accuracy and signal fidelity, mechanical shock should be avoided, as well as damage to the cables through excessive bending. All maintenance and component replacement should be referred to qualified personnel.

## INTRODUCTION

### Warranty

The instrument is warranted for normal use and operation, within specifications, for a period of one year from shipment. LeCroy will either repair or, at our option, replace any product returned to one of our authorized service centers within this period. However, in order to do this we must first examine the product and find that it is defective due to workmanship or materials and not due to misuse, neglect, accident, or abnormal conditions or operation.

LeCroy shall not be responsible for any defect, damage, or failure caused by any of the following: a) attempted repairs or installations by personnel other than LeCroy representatives, or b) improper connection to incompatible equipment or c) for any damage or malfunction caused by the use of non-LeCroy supplies. Furthermore, LeCroy shall not be obligated to service a product that has been modified or integrated where the modification or integration increases the task duration or difficulty of servicing the oscilloscope. Spare and replacement parts, and repairs, all have a 90-day warranty.

### Description

The CDR-O125 is a stand-alone optical clock recovery module that accepts an optical data signal and generates a synchronous clock signal from the data stream. The clock is available electrically at the front panel of the unit either at the full bit rate of the data stream or at 1/8 this rate from two separate SMA connectors.

## Features

- Clock recovery frequency range: 12 MHz to 2.7 GHz and 9.99 GHz to 12.5 GHz
- High Input Sensitivity
- Very Low Jitter
- Fast Rise/Fall Times
- Divide-by-8 and direct Outputs
- AC Power Supply Included

## INSTALLING THE SOFTWARE

The CDR-O125 is shipped with a software CD that contains installation scripts for desktop and control plug-in versions of the CDR control software, along with a copy of the Microsoft® .Net version 2.0 framework.

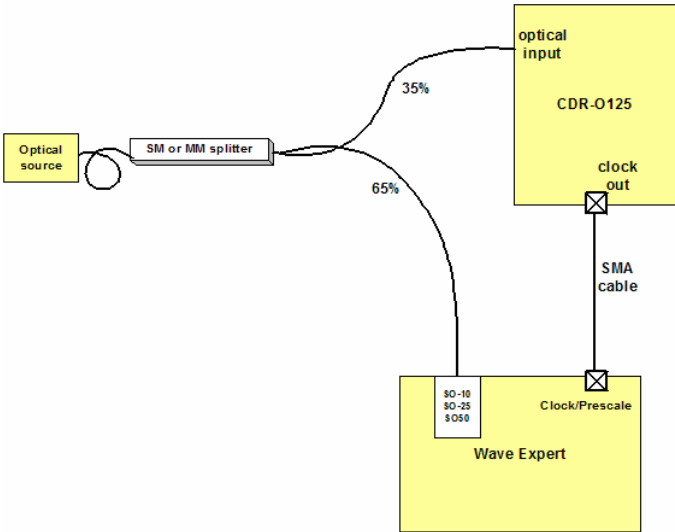
1. Place the CD in the CD-ROM drive at the back of the instrument.
2. Minimize the scope application by selecting **File, Minimize**
3. Execute the install script *OpticalCDRModuleSetup.msi* from the CD-ROM drive (drive Z:)
4. The install script may issue an error message saying it requires the .net framework. If this happens, install the Microsoft .net framework from the CD-ROM (dotnetfx.exe), then install the optical CDR software.
5. If the .net framework installer asks for an updated version of the Microsoft Installer, install version 3.0 of MS installer (WindowsInstaller-KB884016-x86.exe) from the CD-ROM, then install the .net framework.
6. Execute the install script *OpticalCDR.msi* from the CD-ROM drive (drive Z:).

## OPERATION

1. Connect the USB port at the rear panel of the CDR-O125 to one of the available USB ports at the rear of the instrument.
2. Connect the **Clock** output from the CDR-O125 to the **CLOCK/PRESCALE** input of the WaveExpert sampling scope, using the supplied SMA cable.
3. Connect the optical signal to **Optical Input** on the front panel of the optical CDR unit.
4. If you wish to recover the clock from the signal you are measuring, connect the optical signal through a single-mode or multi-mode

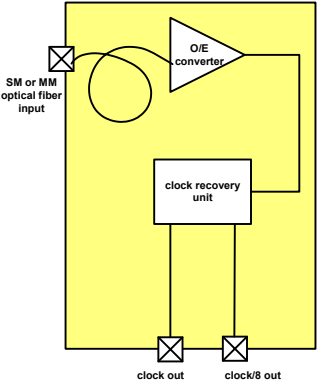
# CDR-O125 Optical Clock Recovery Module

optical splitter, depending upon the type of optical signal. This connection is shown in Figure 1:



**Figure 1. Optical Splitter Connections to CDR-O125**

A functional block diagram of the optical CDR is shown in Figure 2:



**Figure 2. Functional Block Diagram of CDR-O125**

The following steps should be used to operate the CDR if your oscilloscope has the XDEV option:

1. Select **Custom DSO...** from the **Analysis** drop-down menu:

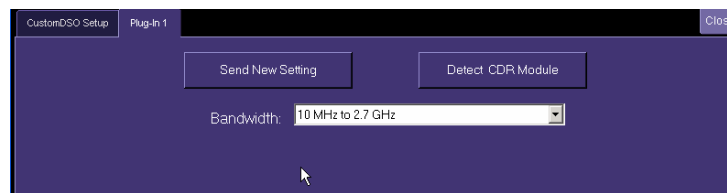




**Figure 3. Custom DSO menu selection (left) and menu (right)**

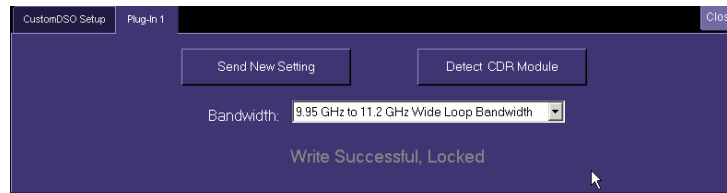
2. Touch the **PlugIn** button in the Custom DSO menu to select the plug-in mode.
3. Enter the name of the optical CDR module plug-in into the “COM ProgID of Plug-In” field (OpticalCDRModule.plugin1) and touch the **Install** button.

**Note:** The name is case-sensitive, so enter it exactly as shown.



**Figure 4. Optical CDR control plug-in initial screen**

4. Touch the **Plug-In 1** tab.
5. Touch the **Detect CDR Module** button to connect to the CDR-O125.
6. The Bandwidth field in the Plug-in 1 dialog allows you to enter the frequency band (12 MHz to 2.7 GHz, 9.9 GHz to 11.2 GHz, or 11.2 GHz to 12.5 GHz). Each of the upper bands has a choice of wide (4 MHz) or narrow (300 kHz) loop bandwidth.
7. Touch the **Send New Setting** button to set the desired band into the CDR-O125.
8. The text below the Bandwidth control shows the status of the CDR-O125:



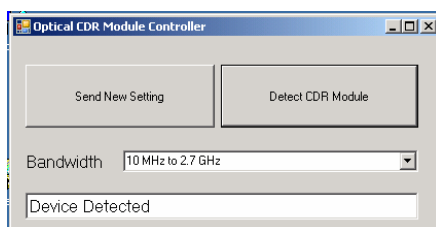
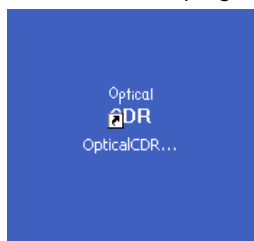
**Figure 5. Optical CDR control plug-in active screen**

## CDR-O125 Optical Clock Recovery Module

**Note:** The control plug-in can be accessed at any time from the **Custom DSO** dialog, and remains active until the unit is powered off. The plug-in must be re-installed from the **Custom DSO** dialog when the instrument is restarted.

The following steps should be used to control the CDR if your system does not have the XDEV option:

1. Minimize the oscilloscope application by selecting **File, Minimize**
2. Locate the optical CDR shortcut icon on the desktop and double-click it to start the Optical CDR control program:



3. Touch the **Detect CDR Module** button to connect to the CDR-O125.
4. The **Bandwidth** drop-down menu allows you to enter the frequency band (12 MHz to 2.7 GHz, 9.9 GHz to 11.2 GHz, or 11.2 GHz to 12.5 GHz). Each of the upper bands has a choice of wide (4 MHz) or narrow (300 kHz) loop bandwidth.
5. Touch the **Send New Setting** button to set the desired band into the CDR-O125.
6. The text below the **Bandwidth** control shows the status of the CDR-O125.

## Front

**Outputs:** The **Clock** and **CLK/8** outputs are available at the SMA connectors simultaneously.

**Input:** The optical signal input is available at an FC-PC type optical connector.



### CAUTION: ESD Sensitive

The CDR-O125 outputs are sensitive to Electrostatic Discharge (ESD). To avoid causing damage to the unit, always follow anti-static procedures (wear wrist strap, etc.) when making connections.

**Led Indicators:** LED indicators at the front indicate power, PLL lock condition, and USB communications.

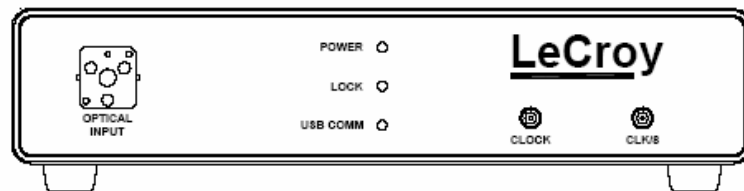


Figure 6. Front of CDR-O125

## Rear

**Input:** A B-type USB jack is provided at the rear panel, which is to be connected to an available USB jack at the rear of the WaveExpert.

**Power in:** An AC plug-in power supply is provided (12 V).

**Power Switch:** A power switch is provided at the rear panel.



### CAUTION

Use only the power supply provided.

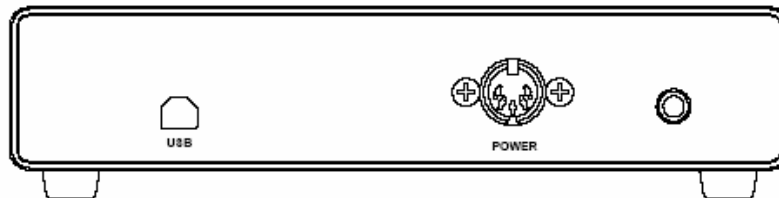


Figure 7. Rear of CDR-O125

# CDR-O125 Optical Clock Recovery Module

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## SPECIFICATIONS

### Product Specifications

#### **Nominal Characteristics**

Nominal characteristics describe parameters and attributes that are guaranteed by design, but do not have associated tolerances.

**Input Optical Modulation Frequency Range:** 12 MHz to 2.7 GHz, 9.9 GHz to 12.5 GHz

**Optical Wavelength Range:** 850 to 1650 nm, single-mode or multi-mode

**Output Impedance:** 50 ohms



**Max. Input Optical Power:** 1 mW peak (0 dBm), 3 mW average (4.7 dBm)

**Non-destruct Power:** 10 mW (10 dBm)

**Electrical Connector Type:** SMA electrical (clock and clock/8)

**Optical Connector Type:** FC-PC

**Power Adapter – For indoor use only**

Input: 100–240 V ~ ( $\pm 10\%$ ), 0.4 A, 47–63 Hz

#### **Typical Characteristics**

Typical characteristics are parameters with no guaranteed performance.

**Input Sensitivity for Lock:** -20 dBm typical @1564 nm, -18 dBm minimum @ 1564 nm; -20 dBm typical @ 1310 nm, -18 dBm minimum @ 1310 nm; -18 dBm typical @ 850 nm, -15 dBm minimum @ 850 nm

**Output RMS Jitter ( $J_{rms}$ ):** < 0.01 UI typical, 12 MHz to 12.5 GHz

**Output Level:** 300 mV<sub>p-p</sub> for both clock and clock/8 outputs

#### **Environmental Characteristics**

Before using this product, ensure that its operating environment will be maintained within these parameters:

**Temperature:** 5 to 40 °C

**Humidity:**  $\leq 80\%$  RH (non-condensing)

#### **Physical Dimensions**

L x W x H: 23.98 x 18.52 x 4.55 cm (9.44 x 7.29 x 1.79 inches)

## Certifications

EC Declaration of Conformity	<p>Meets intent of the European Council Directive 89/336/EEC with Amendments 92/31 EEC and 93/68/EEC for Electromagnetic Compatibility. This declaration is based upon compliance of the SDA-TPS Trigger Prescaler to the following standards:</p> <p>EN 61326:1997+A1:1998</p> <p>EMC requirements for electrical equipment for measurement, control, and laboratory use.</p> <p>EN 55022:1998+A1:2000+A2:2003 Radiated Emissions (Class A)</p> <p>EN 61000-4-2:1995+A1:1998+A2:2001 Electrostatic discharge(±4 kV contact discharge; ±8 kV air discharge)</p> <p>EN61000-4-3:2002 Radio-frequency electromagnetic field 3 V/m (unmodulated, rms) 80% AM (1 kHz)</p>
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