

# Optical Modulation Analyzer Systems



## Key Features

- Up to 65 GHz system bandwidth
- Up to 130 GBaud detectable baud rate
- Up to 160 GS/s sample rate
- Real-time acquisition for testing of coherent modulated optical communications links
- Built-in dispersion compensation, polarization de-multiplexing, and carrier recovery algorithms
- Supports DP-QPSK, DP-16QAM, and a wide variety of other PSK and QAM formats
- Support for custom modulation formats
- Built-in local oscillator
- Adaptive calibration – Receiver can be disconnected and reconnected without factory calibration

Teledyne LeCroy's IQS42 and IQS70 Coherent Optical Receivers integrate seamlessly with Teledyne LeCroy's LabMaster 10Zi-A series of real-time oscilloscopes to provide up to 65 GHz system bandwidth for optical modulation analysis of dual-polarized signals up to 130 GBaud. The Optical-LinQ optical modulation analysis software package provides real-time calibration and control of the Coherent Optical Receiver, and a wide variety of analytical views and parameters.

## Industry Leading System Bandwidth

The 70 GHz IQS70 Coherent Optical Receiver pairs with the LabMaster 10-65Zi-A oscilloscope to provide a system bandwidth of 65 GHz, enabling analysis of signals up to 130 GBaud symbol rate.

For lower-rate applications, the 42 GHz IQS42 Coherent Optical Receiver provides up to 72 GBaud symbol rate analysis for DP-16QAM or DP-QPSK when used with the 36 GHz LabMaster 10-36Zi-A.

## Perfect Calibration, Every Time

In addition to providing the highest bandwidth, the IQS series Coherent Optical Receivers have pristine signal fidelity. Using precision measurements, the entire electrical signal path from the coherent receiver input to the

oscilloscope input is de-embedded. A dynamic self-calibration between the IQS receiver and the oscilloscope enables field disconnection of the oscilloscope for use in other related applications, such as NRZ tributary electrical validation.

## LabMaster 10Zi-A Oscilloscope Performance

LabMaster 10Zi-A is the highest-performance, most scalable oscilloscope system in the world. A single module is capable of two channels of 65 GHz bandwidth, 160 GS/s sample rate or four channels of 36 GHz, 80 GS/s sample rate. Up to 20 modules can be easily integrated into a single system, with the timing accuracy (<130 fs jitter between all channels) and ease of use of a single-box oscilloscope.

# SEAMLESS OMA SYSTEM ARCHITECTURE

The Teledyne LeCroy IQS Coherent Optical Receivers with LabMaster 10Zi-A real-time oscilloscopes provides up to 65 GHz of bandwidth for optical modulation analysis of dual-polarized signals up to 130 Gbaud. That's the highest bandwidth commercial capability in the world.

This combined system is the market leader in OMA solutions; providing ground breaking oscilloscope technology with a seamlessly integrated, intuitive interface and a uniquely scalable format that delivers unrivalled performance. The result is full characterization of an optical signal's true performance – Out of the Box.

## Seamless System Architecture

The Teledyne LeCroy IQS Coherent Optical Receivers leverage a system architecture that allows pairing of the coherent optical receiver with any compatible Teledyne LeCroy oscilloscope without any factory calibration. All required calibrations are built into Coherent Receiver and performed at the time of measurement.

This architecture also enables the easiest upgrade path in the industry – add an additional or faster acquisition module to the oscilloscope, connect the IQS receiver, and resume analysis!

## Seamless Multi-Module Configuration

Teledyne LeCroy's ChannelSync™ architecture ensures superior timing accuracy, by design. Using a single 10 GHz distributed clock for all acquisition modules enables the lowest jitter between all channels, the simplest integration and connection and the highest confidence in results.

The single oscilloscope display gives easy access to all channels and analysis results, regardless of the number of acquisition modules.

## Seamless Software Integration

Optical-LinQ is an intuitive and fully integrated software package for analysis of optically modulated signals. It runs entirely within the user interface of the LabMaster 10Zi-A. No other OMA on the market offers such integrated control of both oscilloscope and coherent receiver.

Optical-LinQ provides fully automated control of the IQS receiver, phase recovery algorithms, polarization de-multiplexing, as well as an exhaustive number of modulation analysis displays and parameters.

## LabMaster MCM-Zi-A Master Control Module

The control, display, clocking, and analysis engine for the 10Zi-A oscilloscope. One MCM-Zi-A is used with multiple acquisition modules to best leverage your initial investment.

## LabMaster 10 Zi-A Acquisition Module

A single acquisition module is available with and industry-leading four channels of 36 GHz of bandwidth, 80 GS/s sampling rate, expandable to 65 GHz bandwidth with 80 GS/s sampling rate.

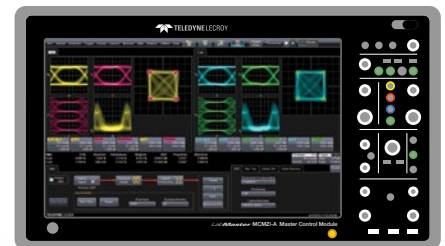
## IQS Coherent Optical Receiver

Up to 70 GHz of electrical bandwidth with internal local oscillator. Unit is controlled by LabMaster MCM-Zi-A Master Control Module through USB connection.

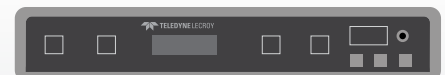
## Optical-LinQ Optical Modulation Analysis Software

Provides fully automated control of the IQS receiver, phase recovery algorithms, polarization de-multiplexing, and a variety of modulation analysis displays and parameters.

MCM-Zi-A MASTER CONTROL MODULE



COHERENT OPTICAL RECEIVER

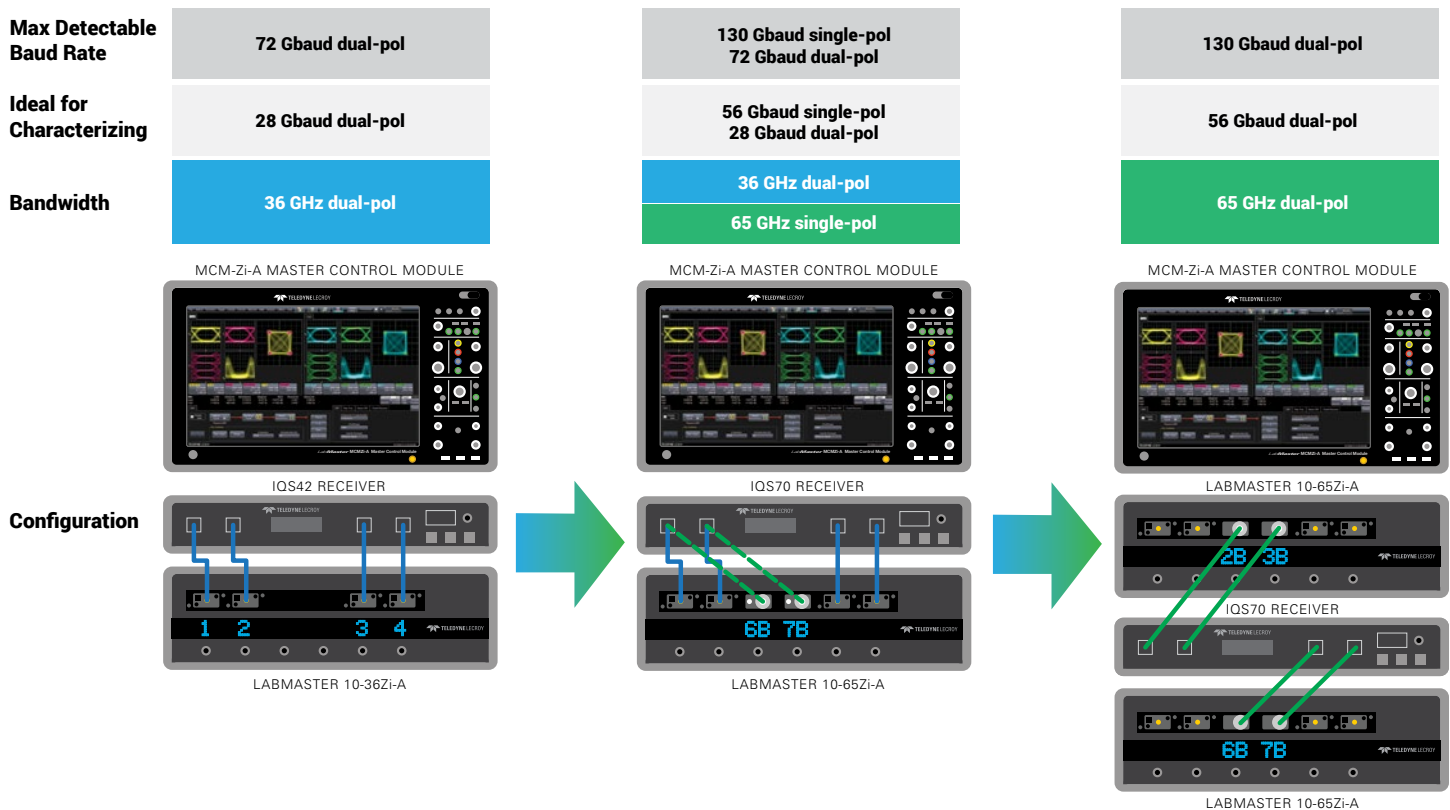


ACQUISITION MODULE



# FULLY SCALABLE ARCHITECTURE WITH BUILT-IN FLEXIBILITY

With optical communications advancing at a rapid pace, equipment requirements are vast and ever-changing. It is critical that an OMA system be scalable to address tomorrow's modulation formats and data rates. Rather than a monolithic, restrictive instrument, the Teledyne LeCroy OMA solution is a set of building blocks that can be easily upgraded and supplemented to address future test challenges.



For developing 100G technologies, the 42 GHz IQS42 receiver, paired with the 4-channel, 36 GHz LabMaster 10-36Zi-A oscilloscope, provides an ideal characterization platform.

As rates move towards 200G and 400G, 56 Gbaud systems are appearing in laboratories and on technology roadmaps. A 70 GHz IQS70 receiver and a LabMaster 10-65Zi-A allows comprehensive characterization of 56 Gbaud signals on a single polarization, as well as dual-pol capabilities at 28+ Gbaud.

Adding a second LabMaster 10-65Zi-A acquisition module results in a fully-capable dual-polarization 56 Gbaud characterization system – with no requirement to return the instrument to the factory or recalibrate!

# INDUSTRY-LEADING OPTICAL MODULATION ANALYSIS

The most accurate characterization demands the most capable measurement system. The Teledyne LeCroy Optical Modulation Analyzer provides the highest system bandwidth (70 GHz), an architecture that combines ultra-precise timing synchronization with simple scalability, and the best-integrated and most feature-rich OMA software package in the industry.

1. World's Highest Bandwidth Coherent Optical Receiver  
– 70 GHz performance enables detection of signals up to 130 Gbaud
2. World's Highest Performing Real-Time Oscilloscope  
– up to 100 GHz bandwidth, 240 GS/s sample rate
3. World's most seamlessly-integrated OMA software  
– Optical LinQ controls both IQS receiver and oscilloscope, and provides exhaustive measurement and visualization capabilities for standard modulation formats like DP-QPSK and DP-16QAM, as well as user-defined custom formats
4. Integrated, automatic calibration – disconnect and reconnect the IQS receiver from the oscilloscope without need for factory re-calibration
5. Modular – start with four channels of 36 GHz for 100G applications, upgrade to two channels of 65 GHz to allow single-pol 200G experiments, or add two more 65 GHz channels for true dual-pol 400G performance







6. ChannelSync architecture utilizes a 10 GHz distributed clock for precise alignment of all acquisition systems – jitter between all channels of less than 130 fs means no compromise relative to single-box oscilloscope systems
7. Wide oscilloscope bandwidth upgrade range (20 - 100 GHz) provides investment protection
8. Single trigger circuit for all modules eliminates additive trigger jitter that occurs with 10 MHz clocking and trigger synchronization of multiple conventional oscilloscopes
9. Server-class multi-core processor combines with X-Stream II streaming architecture for fast acquisition and analysis – 33.6 GHz effective CPU clock rate and 24 GB of RAM standard (expandable to 192 GB)
10. 325 MB/s data transfer rate from the LabMaster to a separate PC with Teledyne LeCroy Serial Interface Bus (LSIB) option
- 6 11. Utilize the built-in 15.3" widescreen (16 x 9) high resolution WXGA color touch screen display – or connect your own with up to WQXGA 2560 x 1600 pixel resolution
12. Highly stable timebase (50fs<sub>rms</sub>) over long acquisitions, low Jitter Measurement and Rj noise floor.
13. Deepest standard toolbox with more measurements, more math, more power

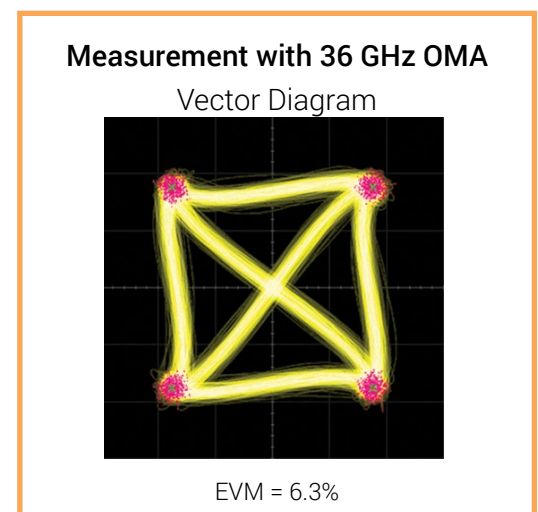
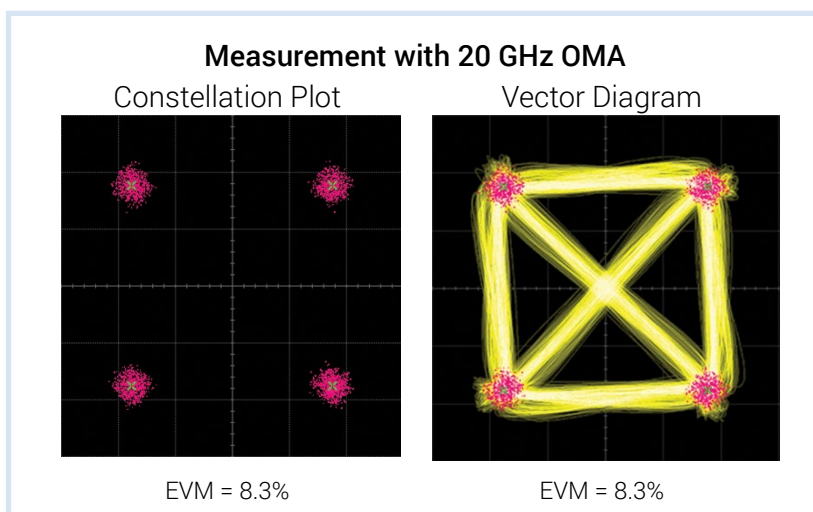
# POSSESS THE POWER OF FULL SIGNAL CHARACTERIZATION

## The Bandwidth Advantage: Full Characterization

It is generally accepted that EVM is a representation of the overall signal quality. However, EVM is calculated from constellation points sampled at the center of symbol, and often fails to represent what happens during symbol transitions. Symbol transitions or trajectories measured with sufficient analyzer bandwidth can reveal transmitter impairments such as IQ data skew, receiver channel skew, pattern dependent jitter, modulator chirp and more. Having an OMA system with a high bandwidth provides the power to fully characterize and troubleshoot a transmitter.

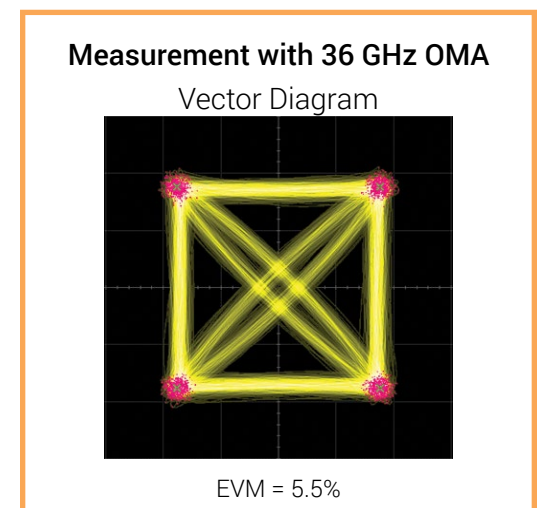
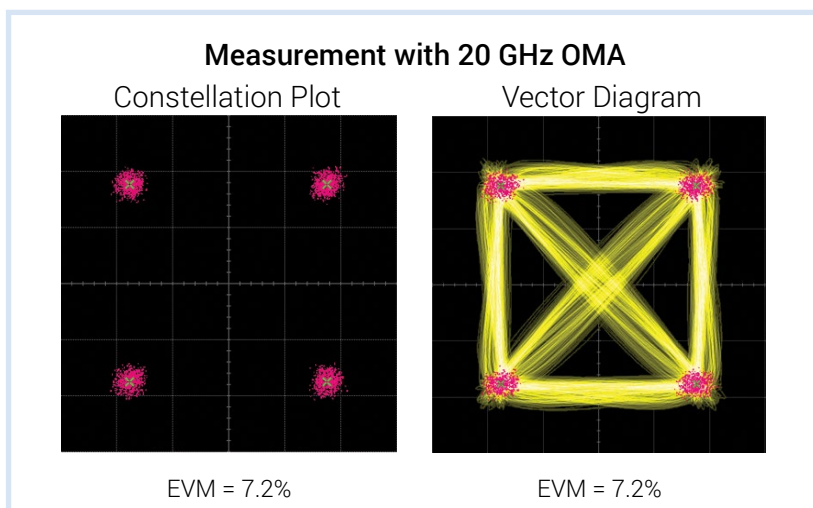
### 32 GBaud QPSK - Modulator Chirp

The chirp, or the instantaneous frequency variation over time, results in curved transitions between symbols on the I vs. Q plot. An adequate bandwidth is necessary to resolve the transition with a high level of accuracy to be able to show the presence of chirp.



### 32 GBaud QPSK - IQSkew

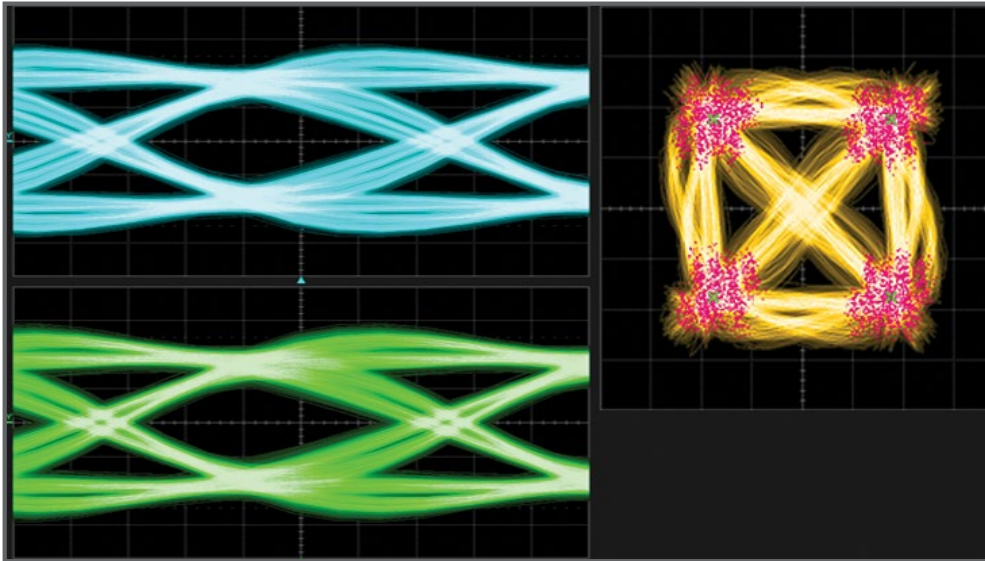
IQ skew, or the time delay between RF drive signals of I and Q channels, introduce curvature to the inner transitions of the I vs Q plot. This is another example of signal characterization that can be achieved with a high bandwidth OMA system.



## 56 GBaud QPSK Source with 40 GHz Bandwidth

Not only does the Teledyne LeCroy IQS series receiver with the LabMaster 10Zi-A series of oscilloscopes provide much greater characterization for 32 GBaud signals, it is the only commercial system capable of revealing a meaningful EVM at 56 GBaud signals and higher.

### Measurement with 33 GHz OMA

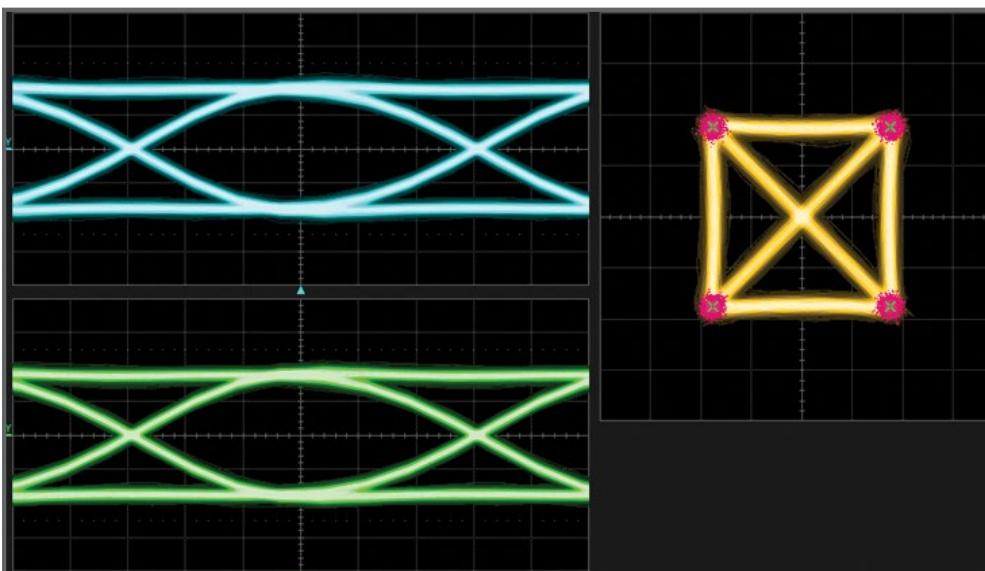


EVM = 23%

### Competing Solutions Only “Detect” High Baud Rates

When signalling speeds increase to rates such as 56 GBaud, insufficient bandwidth in the coherent receiver system causes distortion in the recovered I and Q waveforms, and leads to inaccurate placement of the symbol positions on the IQ plane. The result is incomplete characterization and an inaccurate EVM measurement.

### Measurement with 65 GHz OMA



EVM = 5.8%

### Teledyne LeCroy’s Bandwidth Advantage

With the IQS70 – the only 70 GHz coherent receiver on the market – and a 65 GHz oscilloscope, the Teledyne LeCroy OMA solution is able to fully characterize the incoming signal. The result is clean constellations and eye diagrams with low distortion, accurate symbol placement, and exceptional EVM performance.



# APPLICATIONS

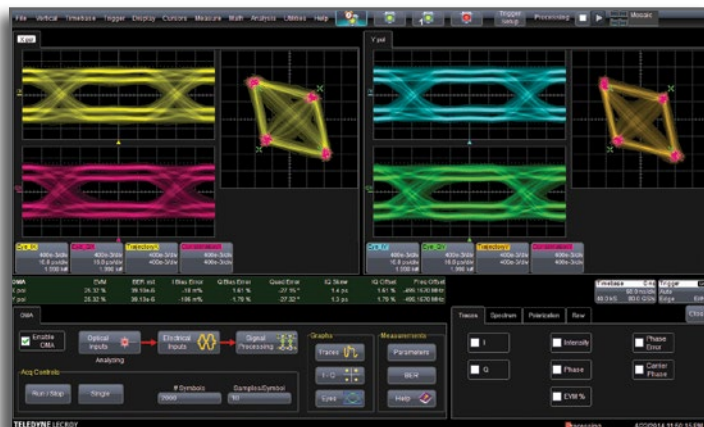


## Visibility for Component Testing

The amplitude and phase measurement capabilities of OpticalLinQ enable detailed component testing. It is now possible to directly measure the effects of a single component on the phase of the electric field.

Common applications and measurements include:

- Modulator research and development
- Modulator chirp measurements
- Dispersion measurements for dispersion compensation elements

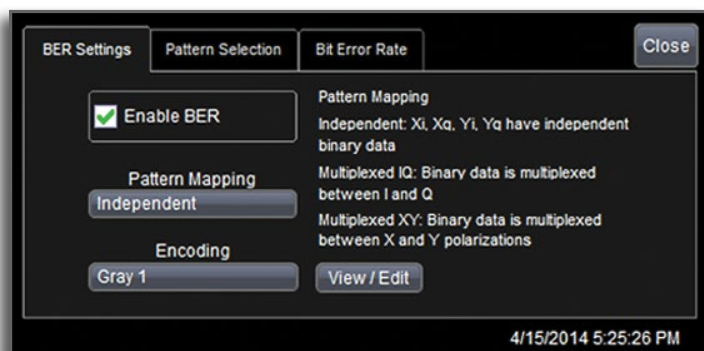


## Evaluation for Transmitter Testing

The high optical/electrical bandwidth is ideal for transmitter evaluation, tuning, and signal fidelity validation. And with 65 GHz of electrical bandwidth, it is now possible to test for the highest bandwidth electrical signal fidelity.

Common applications and measurements include:

- Transmitter control loop validation and testing
- Modulation format research and development
- Forward error correction testing



## True BER Counting

OpticalLinQ offers both quick and convenient BER Estimates along with true and accurate BER counting capabilities. The BER set up panel allows you to configure the coding scheme from one of the common pre-set options, or define your own custom bit sequence and multiplex options.



## Receiver Link Validation

Understanding system performance along the optical link or at the receiver itself is essential to determine the performance of the phase modulated signals. Users can enter fiber-based values for compensation of chromatic dispersion (CD).

Common applications and measurements include:

- State of Polarization versus time
- Total Link Dispersion



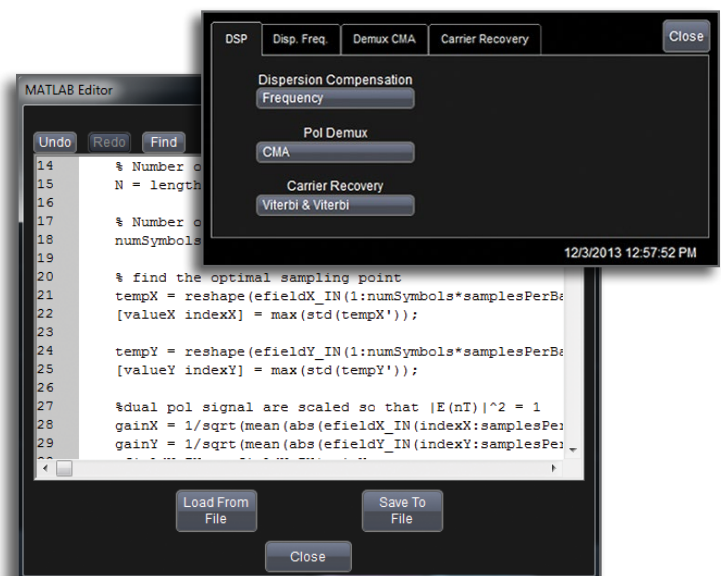
## Custom Modulation Format Development

OpticalLinQ comes with pre-set support for many common optical modulation formats, including QPSK, 16QAM and 64QAM. If you are developing or working with non-conventional modulation formats, you can define your own format using Optical-LINQ's powerful custom modulation format definition capability.

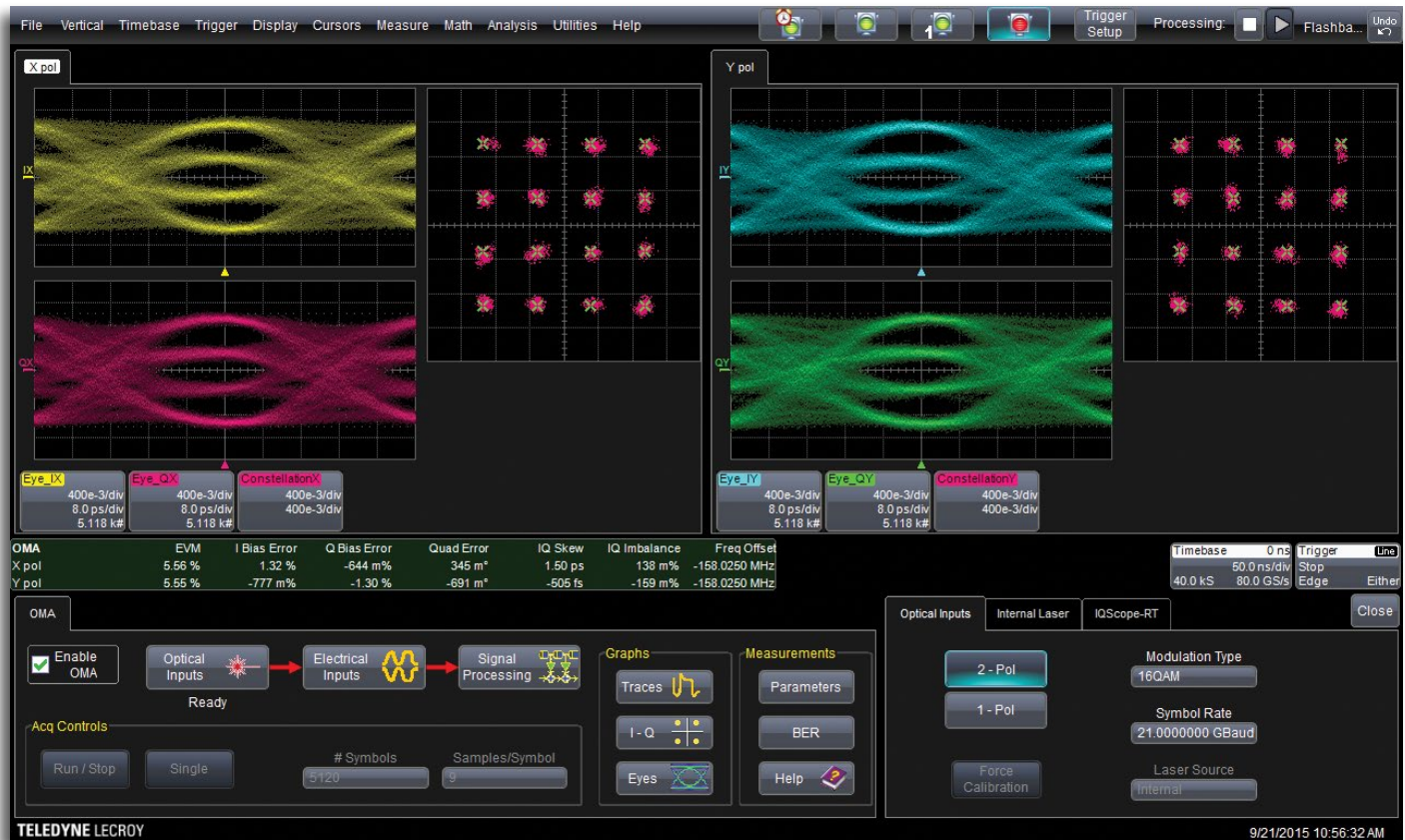


## Custom DSP Algorithm Validation

**Test and validation of digital signal processing (DSP) algorithms** is a vital part of the transceiver development. OpticalLinQ is equipped with built-in DSP algorithms such as CMA, MMA, Viterbi & Viterbi for you to use as tested reference algorithms. And the custom code integration feature lets you use and validate your own algorithms in MATLAB format.



# UNMATCHED SOFTWARE PERFORMANCE



The world leading OpticalLinQ software for analysis of optically modulated signals can now be used with any coherent optical receiver. Users can select a wide variety of analysis views and parametric measurements to gain a complete understanding of their optical signal path.

## Unrivalled Software Integration

The OMA functions and controls are fully integrated in the LabMaster oscilloscope software. You can apply any of LabMaster's extensive signal diagnosis tool kits directly on the OMA signals. LabMaster's user-friendly interface also allow intuitive layout of visual and numerical analysis outputs which can be fully customized to your liking.

## Analysis Views

Display the signal just the way you want it, using Optical-LINQ's extensive list of visualization options:

- I vs. Q Constellation
- I vs. Q Trajectory
- Reference Symbols
- I Eye Diagram
- Q Eye Diagram
- Intensity Eye Diagram
- Phase Eye Diagram
- EVM % Eye Diagram
- Recovered I vs. Time
- Recovered Q vs. Time
- Intensity vs. Time
- Phase vs. Time
- EVM % vs. Time
- Phase Error vs. Time
- Carrier Phase vs. Time
- E-field Spectrum
- I Spectrum
- Q Spectrum
- S1, S2, S3 Polarization State
- Raw I vs. Time
- Raw Q vs. Time
- Calibration Buffer I
- Calibration Buffer Q

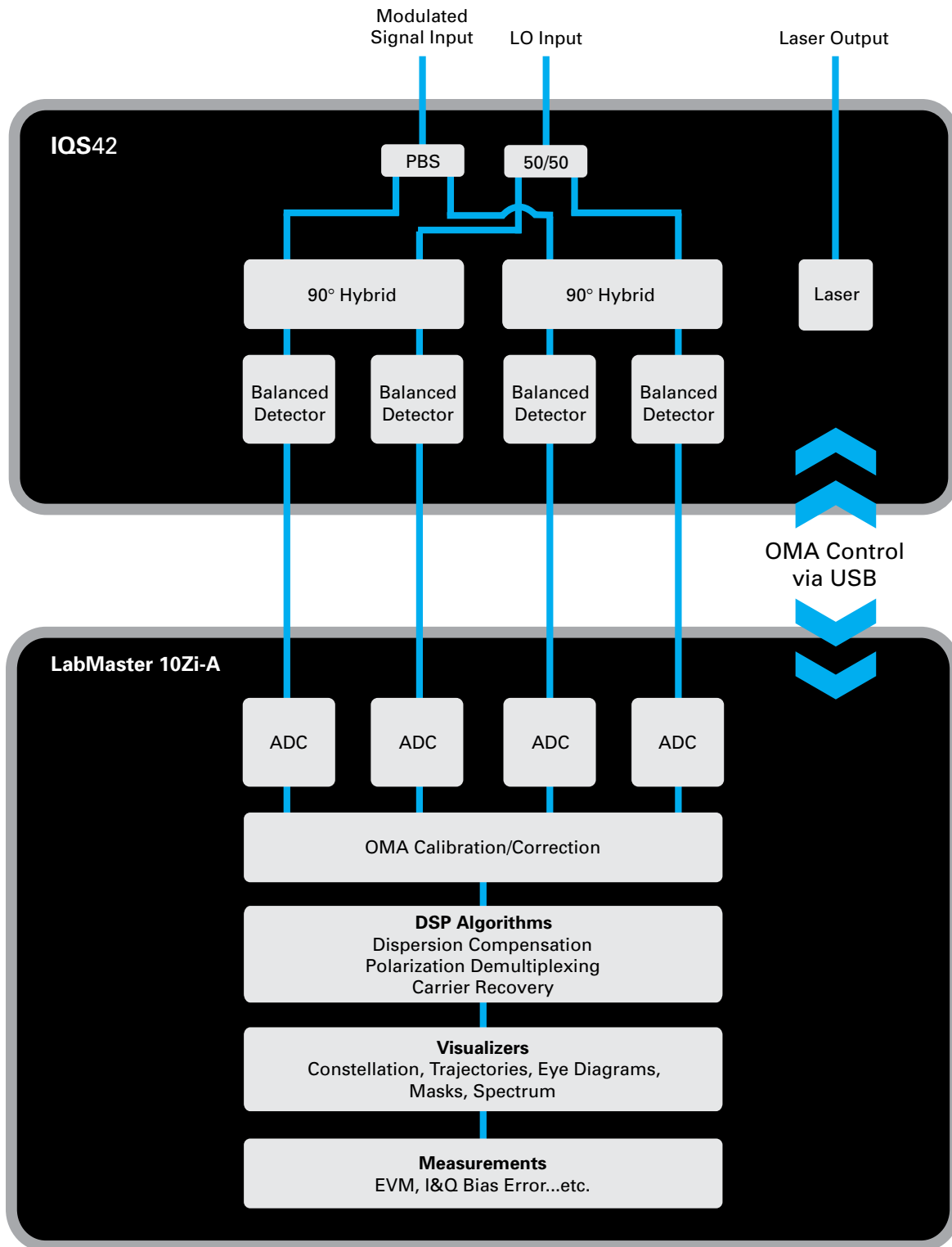
## Parametric Measurements

OpticalLinQ includes the parametric measurements you need to quantify the health of your signal path and modulation. Selected measurements are presented in tabular format that is easily saved for documentation and further analysis.

## Parametric Measurements List

- Error Vector Magnitude
- Q Factor
- BER Estimate
- I Bias Error
- Q Bias Error
- Quadrature Error
- IQ Skew
- IQ Offset
- IQ Imbalance
- Frequency Offset
- Magnitude Error
- Phase Error
- Polarization Mode Dispersion
- XY Skew
- Polarization Dependent Loss

## OMA System Schematic Diagram



# IDEAL SOLUTION FOR ELECTRICAL SIGNAL ANALYSIS

## High Bandwidth, High Precision

LabMaster 10 Zi-A is the world's highest bandwidth (Up to 100 GHz) real time oscilloscope. The modular design allows more channels with better performance, and permits simple and easy upgrades. Yet, the operation is the same as any other oscilloscope – there is a single 10 GHz timebase clock, trigger circuit, and display for all acquisition modules and channels. Teledyne LeCroy's ChannelSync architecture ensures precise synchronization of all acquisition modules and virtually eliminates jitter between channels for the highest possible phase performance.

## Complete Customization

All configurations of LabMaster 10 Zi-A support the needs of researchers with complete customization capability through the use of the XDEV software capability. This provides the ability to integrate a MATLAB or other user-generated script into the oscilloscope's processing stream – ideal for proprietary equalization and compensation algorithms.

## Up to 325 MB/s Data Transfer

Teledyne LeCroy's Serial Interface Bus (LSIB) to allow acquired data to be transferred to another computer at speeds up to 325 MB/s to leverage the LabMaster oscilloscope solely as a data acquisition device with fast offload of acquired data to another CPU for further analysis.

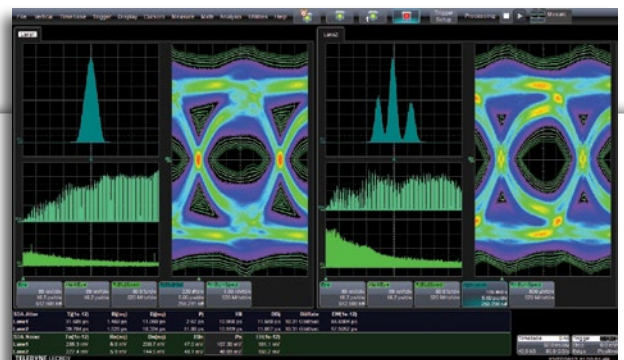


## SDAIII-CompleteLinQ

Teledyne LeCroy's SDAIII-CompleteLinQ Serial Data, Crosstalk and Noise Analysis toolset provides unique capabilities for serial data analysis. It is the only toolset to with simultaneous eye, jitter, noise and crosstalk analysis on multiple lanes.

### SDAIII-CompleteLinQ's Unique Capabilities:

- Four lanes of analysis
- Simultaneous jitter, noise and eye analysis on four lanes
- Extrapolated noise analysis with the new Crosstalk Eye
- Multi-scenario comparisons with the new Reference Lane
- LaneScope Comparison Mode
- Integrated fixture and channel de-embedding/emulation
- Multi-block system and crosstalk modeling with VirtualProbe
- Transmitter and receiver equalization modeling





# SPECIFICATIONS

## IQS42 with LabMaster 10-36Zi-A

## IQS70 with LabMaster 10-65Zi-A

### Optical Modulation Analyzer

Number of Optical Polarizations	2
Error Vector Magnitude Noise Floor	<2.0% (all inclusive)*
Amplitude Error	<2%
Phase Error	<1°
Quadrature Error	<0.5°
Number of Optical Polarizations	2

\* Test conditions: Single Polarization, 13 GHz channel bandwidth, 2.5 GHz frequency offset, 14.5 dBm LO input power, 7.5 dBm signal power

### Oscilloscope Acquisition Performance

Number of Channels	4	
Bandwidth	36 GHz	65 GHz
Sample Rate	80 GS/s	160 GS/s
Jitter Between Channels	<250 fs <sub>rms</sub>	<130 fs <sub>rms</sub>
ADC Resolution	8-bit	
Standard Memory per Channel	32 Mpt/Ch	
Maximum Memory per Channel	512 Mpt/Ch	1024 Mpt/Ch

Internal timebase with 10 GHz clock frequency common to all input channels. Single, distributed 10 GHz clock for all channels ensures precise synchronization with timing accuracy between all channels identical to that provided within a single, conventional oscilloscope package.

### Coherent Optical Receiver Performance

#### Optical DUT Input

Input Wavelength Range	1527 to 1567 nm (C-Band model, option C) 1528 to 1605 nm (C and L -Band model, option CL)
Maximum Input Power	+15 dBm
Maximum Input Power, Damage Level	+19 dBm
Receiver Polarization	>20 dB
Extinction Ratio	

#### Optical LO Output

Optical CW Output Power	+15.5 dBm
Wavelength Range	1527.60 to 1565.50 nm (C-Band model) 1527.60 to 1565.50 nm and 1570.01 to 1608.76 (C and L -Band model)

#### External LO Input

Optical Input Wavelength Range	1528 to 1605 nm
External LO Oscillator Input Power Range	+4 dBm to +15.5 dBm
Maximum Input Peak Power (damage level)	+25 dBm
Instantaneous Linewidth	<500 kHz

#### Other

Electrical Bandwidth	42 GHz typical 37 GHz minimum	70 GHz typical 65 GHz minimum
Optical Phase Angle of I-Q Mixer After Correction	90 deg ±0.5 deg	
Relative Skew After Correction	±1 ps	

#### Local Oscillator

Wavelength Range	1528.77 to 1563.86 nm (C-Band model, option C) 1528.77 to 1563.86 nm 1570.01 to 1608.76 nm (C and L -Band model, option CL)
Minimum Wavelength Step	~1 ppm
Minimum Frequency Step	0.1 GHz
Tuning Time/Sweep Speed	< 30 s
Absolute Wavelength Accuracy	10 ppm
Linewidth (short term)	<100 kHz, 25 kHz typical
Sidemode Suppression Ratio	55 dB typical, >40 dB
RIN	-145 dB/Hz (20 MHz to 10 GHz)

# SPECIFICATIONS

## OpticalLinQ Modulation Analysis Software

Eye Diagrams	I, Q, EVM (EVM% vs. Time), Phase, Intensity All provided for both polarizations, independently or simultaneously
IQ Plots	Constellation with and without vectors All provided for both polarizations, independently or simultaneously
Pattern Plots (Tracks/Trends)	Recovered Data I & Q, Intensity, Phase (Intensity Angle), EVM (EVM% vs. Time), Phase Error vs. Time
Raw Traces	Data I and Q
Spectra	Efield, I and Q
Polarizations	Stokes parameters S1, S2, S3
Measurements	IQ RF (Gain) Imbalance, IQ Quadrature Error, I Bias Error, Q Bias Error, IQ Skew, I-Q Offset (I and Q Bias Error), Magnitude Error, EVM@Symbol (% RMS), EVM Phase Error@Symbol, Q-Factor, BER Estimate, State of Polarization, PMD, XY Skew, PDL, True BER counting
TRUE BER Counting	Supports a variety of data multiplexing options Includes multiple gray codes, binary codes and customizable symbol to binary encoding Support for PRBS patterns 2 <sup>3</sup> -1, 2 <sup>5</sup> -1, 2 <sup>6</sup> -1, 2 <sup>7</sup> -1, 2 <sup>8</sup> -1, 2 <sup>9</sup> -1, 2 <sup>10</sup> -1, 2 <sup>11</sup> -1, 2 <sup>12</sup> -1, 2 <sup>13</sup> -1, 2 <sup>14</sup> -1, 2 <sup>15</sup> -1, 2 <sup>16</sup> -1, 2 <sup>20</sup> -1, 2 <sup>23</sup> -1, 2 <sup>31</sup> -1 and user-defined patterns
Digital Signal Processing	Optical Carrier Phase Recovery, Viterbi & Viterbi, Feed-Forward Chromatic Dispersion - User-entered fiber values, FIR and Frequency domain Polarization De-Multiplexing: Constant-Modulus Algorithm and Multi-Modulus Algorithm with or without FIR equalizer, MATLAB - User-defined
Supported Modulation Formats	Single and dual-polarizations of the following: BPSK, QPSK, DQPSK, 8PSK, BPSK-RZ, QPSK-RZ, DQPSK-RZ, 8PSK-RZ, 8-QAM, 16-QAM, 32-QAM, 64-QAM, 8-QAM-RZ, 16-QAM-RZ, 32-QAM-RZ, 64-QAM-RZ, OOK, OOK-RZ, laser only, Arbitrary user-defined formats

Note: All specifications subject to change without notice

## Physical Characteristics

Dimensions (HWD)	IQS42/IQS70 - 3.82"H x 17.32"W x 15.35"D (97 mm x 440 mm x 390 mm) LabMaster MCM-Zi-A Master Control Module - 10.9"H x 18.2"W x 15.6"D (277 x 462 x 396 mm) LabMaster 10-xxZi-A Acquisition Module - 8.0"H x 18.2"W x 26"D (202 x 462 x 660 mm)
Weight	IQS42/IQS70 - 9.2 kg (20.3 lbs) LabMaster 10-xxZi-A Acquisition Module (20 GHz - 36 GHz) - 53 lbs. (24 kg) LabMaster MCM-Zi-A Master Control Module (20 GHz - 36 GHz) - 47 lbs. (21.4 kg) LabMaster 10-xxZi-A Acquisition Module (50 GHz - 100 GHz) - 58 lbs. (26.3 kg) LabMaster MCM-Zi-A Master Control Module (50 GHz - 100 GHz) - 47 lbs. (21.4 kg)
Power Supply	IQS42/IQS70 - ~100 - 240 V; 50/60 Hz; 20W Max LabMaster 10-xxZi-A Acquisition Module (20 GHz - 36 GHz) - 100-240 VAC ±10% at 45-66 Hz; 1225 W / 1225 VA LabMaster MCM-Zi-A Master Control Module (20 GHz - 36 GHz) - 100-240 VAC ±10% at 45-66 Hz; 450 W / 450 VA. LabMaster 10-xxZi-A Acquisition Module (50 GHz - 100 GHz) - 100-240 VAC ±10% at 45-66 Hz; 1275 W / 1275 VA. LabMaster MCM-Zi-A Master Control Module (50 GHz - 100 GHz) - 100-240 VAC ±10% at 45-66 Hz; 450 W / 450 VA.
Operating Temperature Range	5°C to 45°C (41 °F to 113 °F)
Storage Temperature Range	-40°C to 70°C (-40 °F to 158 °F)

# ORDERING INFORMATION

## Product Description

## Product Code

## Recommended Configurations (see page 3)

### **IQS Series Coherent Optical Receivers**

Dual-pol Coherent Optical Receiver, 42 GHz (Includes one license for OpticalLinQ software)	IQS42
Dual-pol Coherent Optical Receiver, 70 GHz (Includes one license for OpticalLinQ software)	IQS70
Matched set of standard bandwidth rigid cables for IQS receiver (for 20 - 36 GHz configurations)	IQSCABLES -SBW
Matched set of high bandwidth rigid cables for IQS receiver (for 50 - 65 GHz configurations)	IQSCABLES -HBW

### **LabMaster 10Zi-A Series Master Control Modules**

LabMaster Master Control Module with 15.3" WXGA Color Display	LabMaster MCM-Zi-A
SDA Master Control Module with 15.3" WXGA Color Display (provides additional standard software and 64 Mpt/Ch memory)	SDA MCM-Zi-A

### **LabMaster 10Zi-A Series Acquisition Modules**

20 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input	LabMaster 10-20Zi-A
25 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input	LabMaster 10-25Zi-A
30 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input	LabMaster 10-30Zi-A
36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input	LabMaster 10-36Zi-A
50 GHz, 160 GS/s, 2 Ch, 64 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input (36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch)	LabMaster 10-50Zi-A
59 GHz, 160 GS/s, 2 Ch, 64 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input (36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch)	LabMaster 10-59Zi-A
65 GHz, 160 GS/s, 2 Ch, 64 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input (36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch)	LabMaster 10-65Zi-A
100 GHz, 240 GS/s, 1 Ch, 96 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input (36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch)	LabMaster 10-100Zi-A

### **Dual-pol signals up to 32 Gbaud**

LabMaster Master Control Module with 15.3" WXGA Color Display	LabMaster MCM-Zi-A
Dual-pol Coherent Optical Receiver, 42 GHz (Includes one license for OpticalLinQ software)	IQS42
36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input	LabMaster 10-36Zi-A
Matched set of standard bandwidth rigid cables for IQS receiver	IQSCABLES -SBW

### **Dual-pol signals up to 32 Gbaud + single-pol to 64 Gbaud**

LabMaster Master Control Module with 15.3" WXGA Color Display	LabMaster MCM-Zi-A
Dual-pol Coherent Optical Receiver, 70 GHz (Includes one license for OpticalLinQ software)	IQS70
65 GHz, 160 GS/s, 2 Ch, 64 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input (36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch)	LabMaster 10-65Zi-A
Matched set of standard bandwidth rigid cables for IQS receiver (for 36 GHz operation)	IQSCABLES -SBW
Matched set of high bandwidth rigid cables for IQS receiver (for 65 GHz operation)	IQSCABLES -HBW

### **Dual-pol signals up to 64 Gbaud**

LabMaster Master Control Module with 15.3" WXGA Color Display	LabMaster MCM-Zi-A
Dual-pol Coherent Optical Receiver, 70 GHz (Includes one license for OpticalLinQ software)	IQS70
Quantity 2	Qty 2
65 GHz, 160 GS/s, 2 Ch, 64 Mpts/Ch LabMaster 10 Zi Acquisition Module with 50 $\Omega$ input (36 GHz, 80 GS/s, 4 Ch, 32 Mpts/Ch)	LabMaster 10-65Zi-A
Matched set of high bandwidth rigid cables for IQS receiver	IQSCABLES -HBW

## Standard Accessories

### **Included with IQS receiver**

USB cable, std A to std B, qty 1  
PM FC/PC patch cord, 15cm, qty 1  
IEC mains cable for destination country  
Operator's Manual  
Registration card  
Calibration certificate

### **Included with LabMaster MCM-Zi Standard Configuration**

Power Cable for the Destination Country  
Optical 3-button Wheel Mouse USB 2.0  
Printed Getting Started Manual, Anti-virus Software (Trial Version)  
Microsoft Windows 7 License  
Commercial NIST Traceable Calibration with Certificate, 3-year Warranty

### **Included with LabMaster 10-xxZi-A Standard Configuration**

2.92mm Connector Saver: Qty. 4  
1.85mm Barrel Adapter: Qty. 2 (50-65 GHz units only)  
PCIe x 8 cable, 2m long  
PCIe x 4 cable, 2m long  
Power Cable for the Destination Country  
ChannelSync 10 GHz clock cable, 2m long  
Commercial NIST Traceable Calibration with Certificate  
3-year Warranty

# ORDERING INFORMATION

## Options and Accessories for IQS Series Receivers

### Internal LO options

C+L band laser option for IQS42 or IQS70	IQS-CL
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### Rackmount accessories

Rackmount kit for IQS Receiver	IQS-RACKMOUNT
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### Standalone Optical LinQ software

Coherent optical analysis software for WaveMaster 8Zi series oscilloscopes	WM8ZI-OPTICAL-LINQ
Coherent optical analysis software for LabMaster 9Zi series oscilloscopes	LM9ZI-OPTICAL-LINQ
Coherent optical analysis software for LabMaster 10Zi series oscilloscopes	LM10ZI-OPTICAL-LINQ

## Selected Options and Accessories for LabMaster 10Zi-A Series Oscilloscopes

### Memory Options

64 Mpts/Ch Memory Option for LabMaster 10 Zi-A Acquisition Modules	LM10Zi-M-64
128 Mpts/Ch Memory Option for LabMaster 10 Zi-A Acquisition Modules	LM10Zi-L-128
256 Mpts/Ch Memory Option for LabMaster 10 Zi-A Acquisition Modules	LM10Zi-VL-256
512 Mpts/Ch Memory Option for LabMaster 10 Zi-A Acquisition Modules	LM10Zi-XL-512

### CPU, Computer and Other Hardware Options for LabMaster MCM-Zi-A Master Control Module

Additional 500 GB Hard Drive for MCM-Zi-A	MCM-Zi-500GB-RHD-02
48 GB RAM Upgrade for MCM-Zi-A	MCM-Zi-32-UPG-48GBRAM
96 GB RAM Upgrade for MCM-Zi-A	MCM-Zi-32-UPG-96GBRAM
192 GB RAM Upgrade for MCM-Zi-A	MCM-Zi-32-UPG-192GBRAM
GPIB Option for LabMaster MCM-Zi-A	GPIB-3

## Selected Options and Accessories for LabMaster 10Zi-A Series Oscilloscopes (Cont'd)

### High Speed Output Accessories

High-speed PCIe Gen 1 x4 Digitizer Output	LSIB-2
PCI Express x1 Express Card Host Interface for Laptop Express Card Slot	LSIB-HOSTCARD
PCI Express x1 Host Interface Board for Desktop PC	LSIB-HOSTBOARD
PCI Express x4 3-meter Cable with x4 Cable Connectors Included	LSIB-CABLE-3M
PCI Express x4 7-meter Cable with x4 Cable Connectors Included	LSIB-CABLE-7M

### Miscellaneous

MCM-Zi Rackmount Kit	MCM-Zi-RACKMOUNT
LabMaster 10 Zi Acquisition Module Rackmount Kit	LM10Zi-ACQMOD-RACKMOUNT
LabMaster MCM-Zi Softcase	MCM-Zi-SOFTCASE
LabMaster 10 Zi Acquisition Module Soft Carrying Case	LM10Zi-ACQMOD-SOFTCASE

### General Purpose and Application Specific Software Options

Bundle - Multi-Lane SDA LinQ Framework, including Eye, Jitter, Noise, Crosstalk Measurements, with EyeDrII and VirtualProbe	LM10Zi-SDAIII-CompleteLinQ
Single-Lane Serial Data Analysis Framework, Eye and Jitter Measurements (Included as standard with SDA MCM-Zi-A)	LM10Zi-SDAIII
PAM4 eye, jitter and noise analysis	LM10Zi-PAM4
Spectrum Analyzer and Advanced FFT Option	LM10Zi-SPECTRUM
Digital Filter Software Package	LM10Zi-DFP2

*Note: A wide variety of additional software options and probes are also available as part of the LabMaster 10Zi-A oscilloscope product series. Please refer to the LabMaster 10Zi-A datasheet, available at [teledynelecroy.com](http://teledynelecroy.com), for more details*

## Customer Service

Teledyne LeCroy oscilloscopes and probes are designed, built, and tested to ensure high reliability. In the unlikely event you experience difficulties, our digital oscilloscopes are fully warranted for three years and our probes are warranted for one year. This warranty includes:

- No charge for return shipping
- Long-term 7-year support \*
- Upgrade to latest software at no charge

\* 7-year support applies to oscilloscopes and probes only. Due to the rapidly-evolving nature of the optical components used in the IQS42 and IQS70 Coherent Optical Receivers, long-term support for these products will be provided for three years after end-of-life notification of the product.



1-800-5-LeCroy  
[teledynelecroy.com](http://teledynelecroy.com)

Local sales offices are located throughout the world.  
Visit our website to find the most convenient location.