Narda Products for Fiber Optic Applications

Narda manufactures products for OC-192 and OC-768 fiber optic transmission systems. These products perform the data driver and recovery functions and include

- LN and EA Modulator Drivers
- Clock Oscillators
- Clock Recovery Circuits
- PIN/TIA Receivers and OC-192 Avalanche Photodiode Receivers
- Receiver Limiting Amplifiers
- Multi-function Circuits Integrating RF and Digital Modules

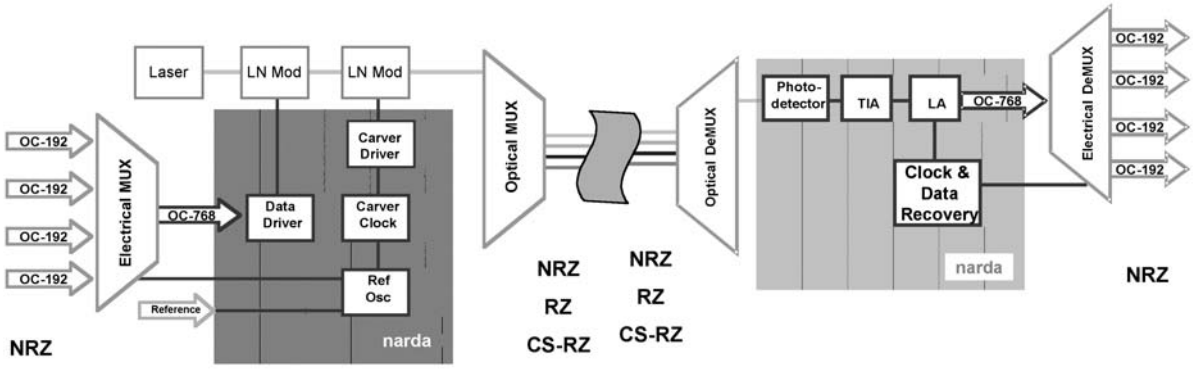
A DWMD optical transmission system is shown below. Narda products are typically employed in the shaded area of the drawing. Standard Products for OC-768 are typically packaged as RF modules with connectors or pins as needed for final integration

Products for OC-192 are normally packaged using SMD and BGA packaging technology and are often multifunctional in nature, integrating digital components and RF circuitry.

Narda has a number of standard driver and oscillator products. Data sheets are provided at the end of this section.

Narda also makes custom products for volume applications. These capabilities are summarized in the following pages.

OC-768 Optical Transmission System



Transmit Side

Receive Side

RF Modules

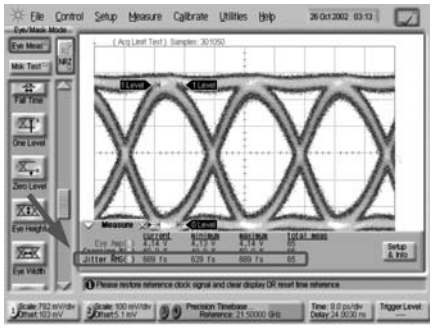
SMD Package

Superior Performance

Because of Narda's expertise in the RF, microwave and mm wave circuits disciplines, its fiber optic products excel in performance. Several examples are discussed below.

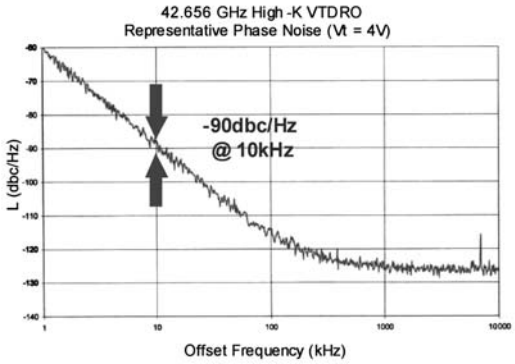
Low Jitter – OC-768 EA Driver

The eye diagram shows the jitter performance of Narda's MDA-FO-40-00 EA Modulator Driver.



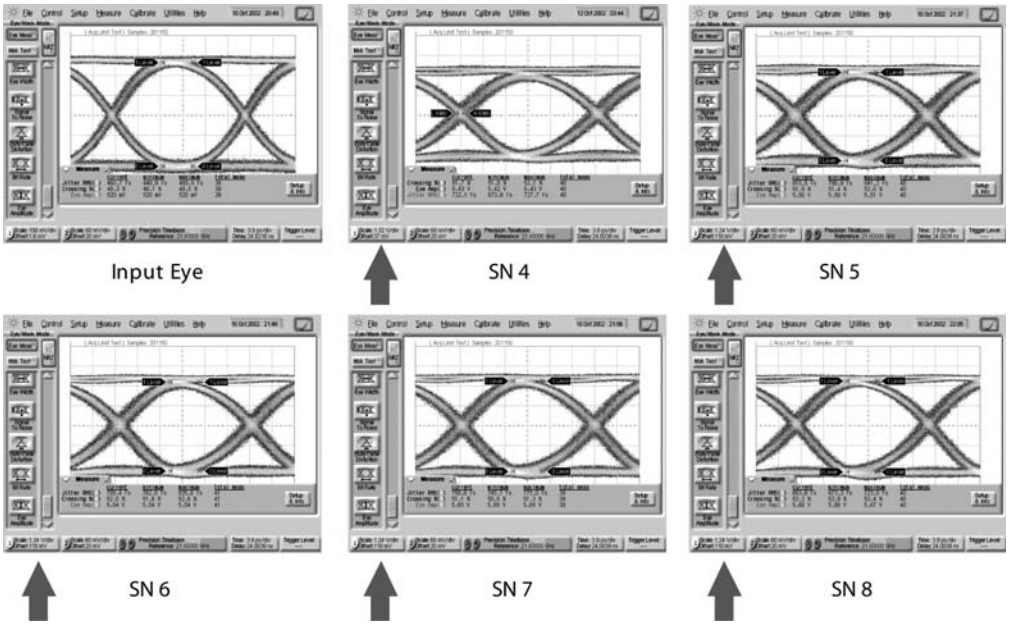
Phase Noise – Clock Oscillator Application

This figure shows the phase noise of a free running 43 GHz voltage tuned DRO.



Repeatability

The figure below illustrates the excellent repeatability realized with Narda's drivers. It compares the eye diagram of 5 separate 40 GHz LN drivers.



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Custom Products

Clock Oscillators

Narda manufactures voltage tuned DRO and phase locked oscillators for OC-192 and OC-768 applications. The unit below is an example of a phased locked VTDRO. This package is typical for the free running and phased locked oscillators and specifications for several standard VTDROs are included at the end of this section.

Clock Recovery Circuits

The unit below is an OC-768 clock recovery circuit. It accepts an input NRZ data rate from 40 to 43.7 GB/s and recovers the system clock with less than 1.5 ps rms jitter and -55 dB spurious signals.

Custom Oscillators

The OC-768 PLL source is an example of Narda's custom capability. This oscillator produces an OC-768 output which is locked to OC-12 reference. The unit has a dual output with relative phase adjustment and was designed to be a modulator driver for a pulse carver modulator.

Custom OC-192 Drivers and Multi-function Assemblies

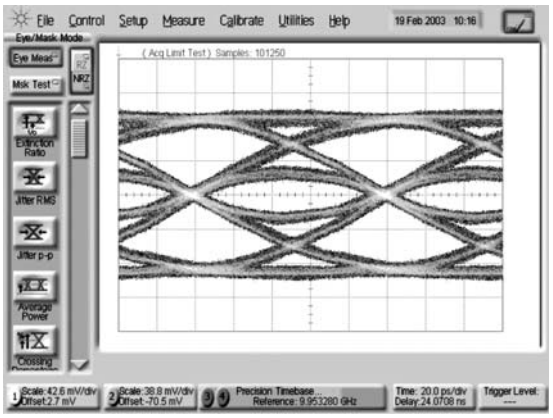
Narda produces custom driver and multifunction assemblies for volume OC-192 applications. Two examples are discussed as follows:

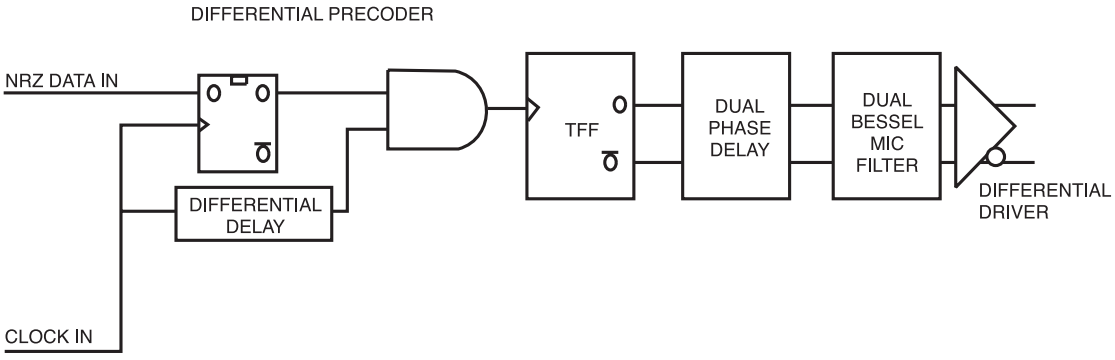
OC-192 EA Driver

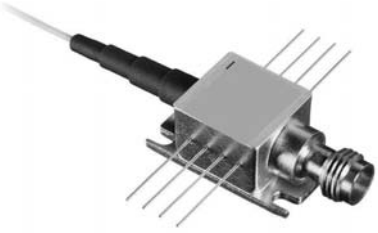
- SMD Package
  .450 x .350 x .040 inches
- Maximum Data Rate
  12.5 GB/s
- Controllable Output Amplitude
  3.5 to 7.0 Bpp
- Input Voltage Range
  .4 to .8 Vpp

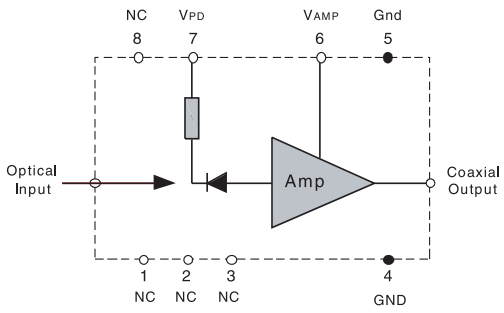
Duo-Binary OC-192 LN Modulator Driver

Narda's duo-binary modulator drivers convert NRZ to duo-binary waveforms at data rates of up to 12.5GB/s with the high voltage output needed for good modulator performance. The eye diagram for this complex waveform is shown to the right.









PIN/TIA Receivers

Narda offers PIN/TIA receivers for volume applications for both OC-192 and OC-768 requirements. The features of Narda's Model FO-RX-40-00 are summarized below. Capabilities also include higher sensitivity Avalanche Photodiode Receivers for OC-192.

- 43 Gb/s PIN/TIA Receiver Module
- 120 V/W Conversion Gain, Low PDR
- -9 dBm Sensitivity, +3 dBm Overload
- -5.2V power, Anritsu-V Output Connector
- 1200 to 1650 nm
- 200 V/A Transimpedence Gain

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