TAITIEN

Ultra Low Jitter Crystal Oscillator for High Speed Optical Modules

Key Features

- Various packages: 7.0 x 5.0 mm, 5.0 x 3.2 mm, 3.2 x 2.5 mm, 2.5 x 2.0 mm, to support flexibility and miniaturization of PCB design
- Ultra low integrated phase jitter 50fs, 12kHz to 20MHz
- Low phase jitter, as low as 50fs @ 156.25MHz
- Wide operation temperature range, -45°C to 85°C, 105°C or 125°C
- Multiple options for differential signal output: LVPECL /LVDS/HCSL
- Operation supply voltage: 1.8V, 2.5V and 3.3V
- Pb-free/RoHS compliant

Application

- Optical transceiver modules for data center, switch and router
- High Speed A/D, D/A Converters
- Testing and Instrument
- Silicon photonics

Overview

Rapid adoption of 5G technology and IoT devices which drive the demand of high data rate optical modules, especially from data center for inter and intra communication purpose. Increase the optical module data rate from current 100Gbps to 400Gbps/800Gbps is an efficient way to upgrade the network infrastructure, where PAM4 signal modulation and coherent technology are the key for the new high data rate optical module design. To fulfill the tight design requirement of new PAM4 type optical module, a high frequency, tight stability, low jitter, low power consumption and small size differential crystal oscillator is very critical.

As a leading company in Frequency Control Products, Taitien's crystal oscillator are being used at the forefront of the optical module industry. Recently, we release a new series of crystal oscillator (OB-U series). It's ultra-low jitter performance (50fs typical, 100fs max), low current consumption and smaller size (2.5 x 2.0 mm), are best fit for PAM4 type optical module design for data center, server and networking application.

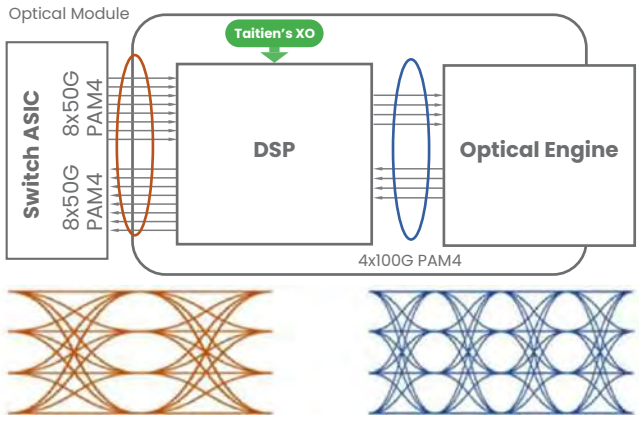
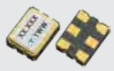
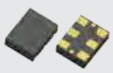
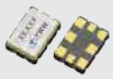


*Figure 1: Structure of PAM4 coherent optical design

Product Line up

Product Series		Output Logic	Out Freq Range Standard Freq(MHz)	Idd (mA)	VDD (V)	Integrated Phase Jitter (12kHz to 20MHz)	Package Size (mm)
OB-U		LVPECL, LVDS HCSL	100 to 175 MHz 100, 125, 156.25 MHz	LVPECL: 65 mA LVDS: 30 mA HCSL: 42 mA	1.8V 2.5V 3.3V	0.05 ps	2.5 x 2.0
OA-U		LVPECL, LVDS HCSL	100 to 175 MHz 100, 125, 156.25 MHz	LVPECL: 65 mA LVDS: 30 mA HCSL: 42 mA	1.8V 2.5V 3.3V	0.05 ps	3.2 x 2.5
OW-U		LVPECL, LVDS HCSL	100 to 175 MHz 100, 125, 156.25 MHz	LVPECL: 65 mA LVDS: 30 mA HCSL: 42 mA	1.8V 2.5V 3.3V	0.05 ps	5.0 x 3.2
ON-K*		LVPECL, LVDS HCSL, CML	15 to 2100 MHz Any Frequency	LVPECL: 95 mA LVDS: 70 mA HCSL: 70 mA	1.8V 2.5V 3.3V	0.15 ps	2.5 x 2.0
OJ-M		LVPECL, LVDS HCSL, CML CMOS	15 to 2100 MHz Any Frequency	LVPECL: 95 mA LVDS: 70 mA HCSL: 94 mA	1.8V 2.5V 3.3V	0.15 ps	5.0 x 3.2
OD-M		LVPECL, LVDS HCSL, CML CMOS	15 to 2100 MHz Any Frequency	LVPECL: 95 mA LVDS: 70 mA HCSL: 94 mA	1.8V 2.5V 3.3V	0.15 ps	7.0 x 5.0

*: Additional 12-pin package available

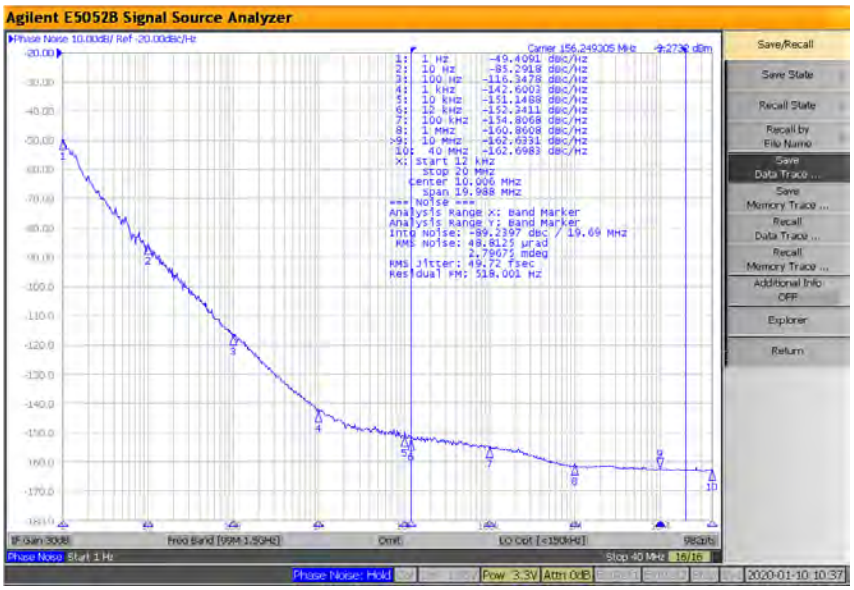


Figure 3: Phase noise performance @ 156.25MHz

Summary

This application note introduces development of optical module. Also the important criteria of crystal oscillator selection for high speed optical module application.

*Note: Structure of PAM4 coherent optical design figure reference by www.fibermall.com

www.taitien.com sales@taitien.com.tw

AP20230223
Rev(2) 03/2023