



Flareon Ultra SFN7322F Dual-Port 10GbE PCIe 3.0 PTP Server I/O Adapter with Hardware Time Stamping

Flareon™ Ultra SFN7322F dual-port 10G Ethernet SFP+ server adapter combines accurate host clock synchronization and precise hardware packet time stamping with unmatched message rates and ultra-low latency 10G Ethernet. The SFN7322F delivers unmatched precision and performance on a single data network and in a single PCIe slot for financial services and other enterprise data centers with the industry's lowest power consumption for additional cost savings.

The SFN7322F provides a comprehensive IEEE 1588 precision time protocol solution which includes a unique PTP daemon (PTPd v2) with advanced features. The SFN7322F eliminates the need for a secondary server adapter and dedicated appliances, as well as additional physical networks, otherwise required for clock distribution.

High-Precision Hardware Time Stamping

The SFN7322F performs high-precision hardware time stamping of all received Ethernet frames at line rate on both ports. The SFN7322F enables nanosecond network performance analysis, precise real-time packet capture, and accurate Service Level Agreement (SLA) measurements.

The SFN7322F driver is compatible with the SFN7122F, and seamlessly interfaces to host software time synchronization solutions that utilize the standard Linux socket option SO_TIMESTAMPING.

Complete Time Synchronization Solution

Solarflare provides its enhanced PTPd v2 daemon with unique features to enable a complete solution to synchronize the host server clock to the network master clock:

- Dual-clock servos
- PTP clock failover with bonding
- Hybrid multicast mode
- PTP operation in VLANs

Ultra-Low Latency

With OpenOnload®, the SFN7322F delivers packets directly to user space, bypassing kernel and network overheads while maintaining complete application compatibility and protocol compliance. This integrated solution accelerates latency-sensitive applications where precision time is critical, such as high performance computing, cloud, grid, and financial services in enterprise data center environments.

The Flareon Ultra SFN7322F supports PCIe 3.0 with ultra-low latency features such as direct packet transfer (Tx PIO) mode, which includes a templated send API. The SFN7322F reduces CPU load with hardware acceleration features that optimize packet delivery, such as UDP multicast replication, integrated layer 2 switching capability, VLAN insertion / removal, and TCP segmentation offload (TSO).

Server running PTPd (slave) PTP master



SFN7322F dual-clock servo precision

SFN7322F Highly Accurate Time Synchronization and Precise Hardware Time Stamping

Solarflare's SFN7322F utilizes a highly stable and precise Stratum 3 clock source, which enables a server to be synchronized to a data network clock with greater precision. Standard crystals can drift significantly, resulting in an inferior solution for clock synchronization and time stamping. For example, between PTP synchronization cycles a typical 15 PPM crystal can drift up to 4000% more than the SFN7322's 0.37 PPM Stratum 3 clock source. Consequently, the SFN7322F significantly improves server clock accuracy and time stamp precision. SFN7322F also features a Pulse Per Second (1PPS) input circuit that can be used to calibrate the PTP offset, and an accurate 1PPS output circuit aligned to the SFN7322F's Stratum 3 clock.

Flareon Ultra SFN7322F

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SFN7322F

Specifications

Product Number
SFN7322F

Standards & Compliance

IEEE 1588 v2
IEEE 802.3ae
IEEE 802.3ad
IEEE 802.1Q
IEEE 802.1p
IEEE 802.3x
RoHS Compliant

Power
5.9W (typical)

Operating Range
0° to 65° C
100 LFM, Min.

Physical Dimensions

L: 13.4 cm (5.3 in)
W: 6.9 cm (2.7 in)
End bracket height:
PCI Express standard
12.0 cm (4.725 in)
PCI Express low-profile
7.92 cm (3.12 in)

Order Information

SFN7322F
Flareon Ultra Dual-Port
10GbE PCIe 3.0 PTP Server
I/O Adapter with Hardware
Time Stamping

Options Order Information

SOLR-PPS-DP10G
Pulse Per Second (PPS)
dual-port 10GbE bracket kit
with PPS cable assemblies

Regulatory product code: S7120

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Advanced Features & Benefits

Precision Packet Time Stamping

7.5ns resolution

Stable Precision Oscillator

Stratum 3 compliant; short term drift $< 3.7 \times 10^{-7}$ in 24 hours

Server Clock Synchronization Accuracy

Sub 200ns

1PPS-input circuit

Rising edge active, TTL into 50Ω

1PPS-output circuit

Rising edge on-time, TTL into 50Ω

I/O Virtualization

2048 guest OS protected vNICs; 240 virtual functions;
16 physical functions

PCI Express

PCIe 3.0 x8 @ 8.0 GT/s

SFC9120 10G Ethernet Controller

Supports high-performance 10GbE

SFP+ Support

Supports optical & copper SFP/SFP+ modules; Direct-Attach,
Fiber (10G or 1G), 1G/10G combo

1000BASE-T SFP Support

Supports 1G 1000BASE-T SFP modules

Low Latency

Cut-through architecture/intelligent interrupt coalescing

Receive Side Scaling (RSS)

Distributes IPv4, IPv6 loads across all CPU cores;
MSI-X minimizes interrupt overhead

Hardware Offloads

TSO, LRO, GSO; IPv4/IPv6; TCP, UDP checksums

Adapter Teaming/Link Aggregation

LACP for redundant links & increased bandwidth
(compatible with MLAG)

Jumbo Frames

9216 byte MTU for performance

Enhanced Tuning

Adaptive interrupt moderation

IP Flow Filtering

Hardware directs packets based on IP, TCP, UDP headers

Advanced Packet Filtering

4096 multicast filters; 4096 VLANs/port; adaptive TCP/UDP/IP,
MAC, VLAN, RSS, RFS filtering; Accelerated Receive Flow
Steering (RFS)

Intel QuickData™

Uses host DMA engines to accelerate I/O

Remote Boot

PXE, iSCSI boot; unattended installation

Management

SNMP, ACPI v3.0

Virtualization Support*

VMware ESXi; Microsoft Hyper-V; XenServer; Linux KVM;
SR-IOV

Operating Systems

RHEL 5,6, MRG; SLES 10, 11, SLERT; other Linux; Windows
Server*

*Future support. Please refer to the driver release notes at www.solarflare.com
for feature availability.

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