M64/64T Managed Timing Engine (MTE) Module

APPLICATIONS

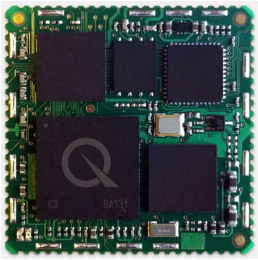
- Small cells, macro-cells (eNodeBs) etc.
- Mobile Backhaul Carrier Ethernet equipment
- Power grid time synchronization client/slave systems
- Sensor network slave device
- Internet of things & Industrial automation precision timing

FEATURES

- Full IEEE 1588 -2008 PTP master or slave clock
- Supports GPS and PTP input
- Supports one-step and two- step clock
- Supports P2P and E2E modes
- Supports multicast and unicast
- Supports 32/64/128+ slaves at 128 packets per second, unicast (M64T)
- Supports 8 slaves @16packets per second (M64)
- Supports frequency recovery
- Low power, small form factor
- Telecom, power and default profiles
- Fully transparent, low latency pass through traffic
- Industry leading algorithms for G.8261 test suite

BENEFITS

- Easy integration in host system
- Low power consumption allows POE capability on host system
- Low total cost of ownership



M64/64T Ordinary Clock Module

High capacity mobile networks and other emerging applications such as smart grid, wireless sensor networks, Internet of Things etc. require precise time and frequency synchronization. These requirements are getting stricter, especially in the next generation 4G LTE infrastructure. Qulsar's Managed Timing Engine (MTE) Module is a full packet network based synchronization engine, which is custom designed for such 'end-point' applications.

A key innovation is that the M64 series can be integrated in an existing communication path. This, along with its standard interfaces, low latency, fully transparent data communication at gigabit speed makes integration into a host system simple. It operates at low power and is a cost optimal solution. The M64 series uses industry leading algorithms to extract and deliver highly accurate synchronization performance.

The M64 is an ordinary clock and can run as a slave or master:

•Slave: Uses industry leading algorithms to extract time from a PTP input stream and produces stable frequency and time outputs

•Master: Generates PTP, frequency and phase outputs acting as the master. It is also capable of utilizing multi-sync inputs.

The M64 is capable of synchronizing 8 slaves at 16 packets per second whereas the M64T can scale to 128 slaves at 128 packets per second.

Design & Integration

The M64 series provides a simple and cost effective option to integrate precision timing by replacing standard generic parts in host systems. The M64 series can also replace the PHY in the host system, supporting line-rate traffic.

The M64 series offers designers the ability to integrate precision synchronization technology into their systems. For rapid 'turnkey' integration, the M64 series can be prepackaged in a subsystem that can be used as a synchronization 'system', enabling a rapid design cycle with future possibilities for deeper integration. The first step towards integration is the purchase of a Evaluation & Developer's Kit that includes all the interface details, licenses and tools necessary for enabling the design effort.

This module is designed for light-weight end applications such as small cells (and femtocells), Carrier Ethernet based mobile backhaul networks, sensor networks; and Intelligent Electronic Devices (IEDs) in smart grid power utility networks.

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M64/64T MTE Module

Pass-Through Technology

One of the innovative features of the M64 series is that it can be integrated into an existing communication path. It features a low latency, fully transparent data communication channel at gigabit speed. It also allows for daisy chaining architectures of host systems.

Multi-sync & Algorithms

The M64 series has industry leading algorithms that enable it to extract precise time signals from packets impeded over the network by traffic load, congestion and packet delay variation (PDV). In addition, the M64 series supports SyncE for frequency recovery unaffected by network PDV. The ability to use multiple synchronization inputs is particularly powerful in today's applications, where a host system may need to be versatile and deployable in multiple environments.

System Features

- IEEE 1588-2008 PTP master or slave clock
- Fully compliant to telecom, power and default profiles
- Multi-sync handling support
- Frequency accuracy better than 1ppb under ITU-T G.8261 test conditions [1]
- Phase accuracy better than ±1µs accuracy under G.8261 testing conditions [1]
- Enhanced synchronization and network performance metrics

Network Interface

- Upstream 1GbE magnetics
- Downstream 1 RGMII port
- Wirespeed low latency pass-through
- Integrated TCP/IP stack
- IPv4 and IPv6 (PTP)

[1] ITU-T G.8261 tests conducted at both Qulsar internal labs and 3rd party labs – details available on request and under NDA

Technical Specifications

Ethernet

- Wire speed 1GbE pass-through

PTP Master

- Accuracy with GPS as reference better than ±25ns
- Support 8/32/64/128+ slaves
- Support 1 step and 2 step
- Output Sync rate: up to 128 sync packet per second (individually programmable per slave)

PTP Slave

- Time alignment, better than ±1 µs on a managed 10-switch GbE network under G.8261 test conditions.[2]
- Frequency alignment, better than ±10 ppb on a managed 10-switch GbE network under G.8261 test conditions.[2]
- Supports 1-step and 2-step
- Input sync rate: up to 128 sync packets per second

Other Features

- DHCP client
- FTP server
- TELNET server
- SSH server
- Serial terminal
- Remote firmware upgrade
- Command line interface configuration (Telnet, SSH or serial port terminal)

Input Synchronization Interfaces

- PTP: Ethernet (L2) or UDP IPv4/IPv6 (L3)
- 1PPS
- ToD in: TTL, 4800/9600 bps, via dedicated pin port up to 115200 bps via serial port

Output Synchronization Interfaces

- Freq. out: 5/10/20/25 MHz
- PPS out: up to 2 kHz with 1 µs resolution
- ToD out: TTL 4800/9600 bps on dedicated pin. Up to 115200 bps on serial port.
- PTP: Ethernet (L2) or UDP IPv4/IPv6 (L3)

ToD Format (output)

- ASCII (YYYY-MM-DD HH:MM:SS)
- NMEA & China Mobile binary format

Other Interfaces

- GPIO, Asynchronous serial, SPI RGMII, MDIO, LVTTL

Operating Specifications

- Supply: 3.3V, 1.8V, 1.2V +/- 10%
- Operating temperature: 0°C to 70°C (-40°C to 85°C optional)
- RoHS compliant
- Low power processor module: 1.1W (typical)

Physical Specifications

- Package: LCC84
- Size: 29.2 mm X 29.2 mm X 2.8 mm

Ordering Information

83-400-00 MTE Module M64 Ordinary Clock 8 slaves @16pps
83-405-00 MTE Module M64T Ordinary Clock 32 slaves @128pps
83-406-00 MTE Module M64T Gateway Clock 64 slaves @128pps
83-407-00 MTE Module M64T Gateway Clock 128 slaves @128pps

[2] With industry standard PDV profiles of switches and network conditions.

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