

# μPD60611

## Extended Single Channel 10/100 Ethernet PHY

The 10/100 Ethernet PHY is a fully integrated physical layer device to connect to standard IEEE802.3 Ethernet networks. The device specifically focuses on low latency and low jitter to support today's Industrial Ethernet standards. Renesas' specific enhanced diagnosis features allow a permanent cable quality monitoring for easy maintenance in factory automation by early failure recognition and prediction. In addition it features hardware support for PTP as defined in IEEE1588 v2 including time controlled generation and recognition of events on I/O pins.

The PHY can be connected to twisted-pair cable via external magnetics or to optical fibre via fibre PMD modules. To the upper layer (MAC) it interfaces to an Ethernet MAC layer through the IEEE 802.3 Standard Media Independent Interface (MII) or reduced MII interface

### Applications

- Industrial networking such as PROFINET, EtherNet/IP, Modbus TCP/IP, EtherCAT or others
- 10/100 Mbps LAN on motherboard (LOM) and network interface card (NIC)
- Switches, routers and repeaters with 10/100 Mbps capable ports
- Test and measurement applications
- Home servers, broadband routers, printers, game equipment and IP phones
- Telecom base stations
- Real-time networking
- Audio/video transmission

### Product features

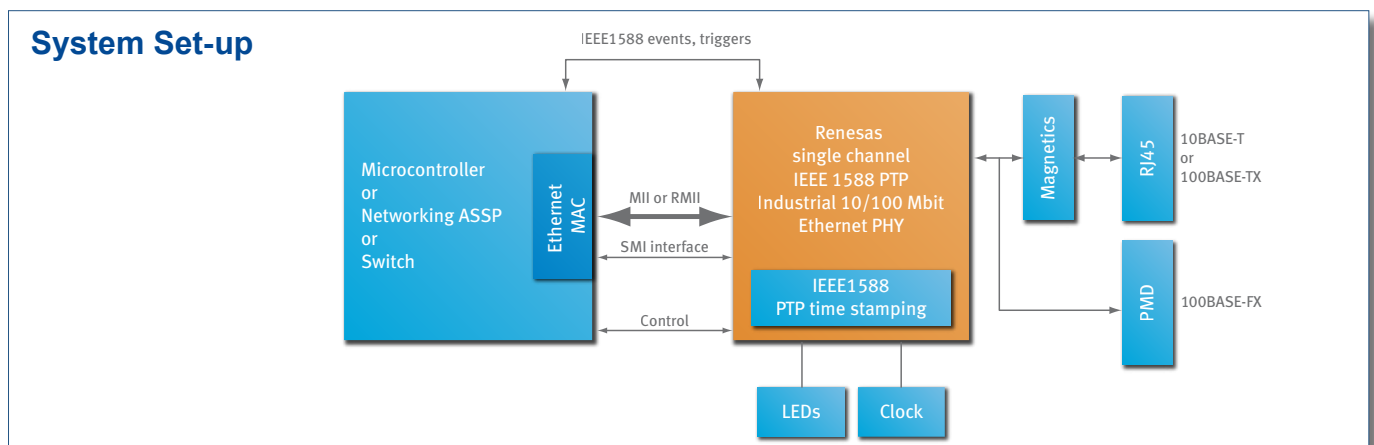
- Fully standard compliant with IEEE 802.3/802.3u for 100BASE-TX, 100BASE-FX and 10BASE-T
- MDI interface:
  - » 10BASE-T and 100BASE-TX to UTP cable via magnetics
  - » 100BASE-FX to fiber via optical module
- Integrated PMD sub-layer featuring adaptive equalization and baseline wander correction
- IEEE 802.3u auto-negotiation and parallel detection
- Full and half duplex operation
- Supports automatic polarity detection and correction
- Supports automatic MDI/MDI-X crossover
- Supports IEEE1588 v1 and v2

### Special features

- Low latency and low jitter for industrial networking
- Fast link-down detection
- Permanent cable quality tracking
- Fast link-up option
- Industrial networking special auto-negotiation function
- Fast error detection
- Cable monitoring and error detection
- 1 ns resolution timer for hardware support of IEEE1588
- Timestamping function to timestamp incoming and outgoing telegrams and pin activity
- Enhanced system testability (such as bypass, loopback and cable length measurement by TDR)
- Output pins controlled by internal clock

### Upper layer interface

- Flexible MAC interface: MII and RMII
- Serial management port (MDC/MDIO)
- Supports user programmable interrupts
- Enables software power-up/down and automatic power-up/down by energy detection
- Single 3.3V power supply
- Operating temperature:  $T_{\text{ambient}} = -40$  to  $+85$  °C ( $T_{\text{junction}}$  from  $-40$  to  $+125$ °C)



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## Development tools

A Starter Kit is available under the ordercode SK-ETHER-PHY-ASSP1.

For samples please contact your Renesas office or distributor.

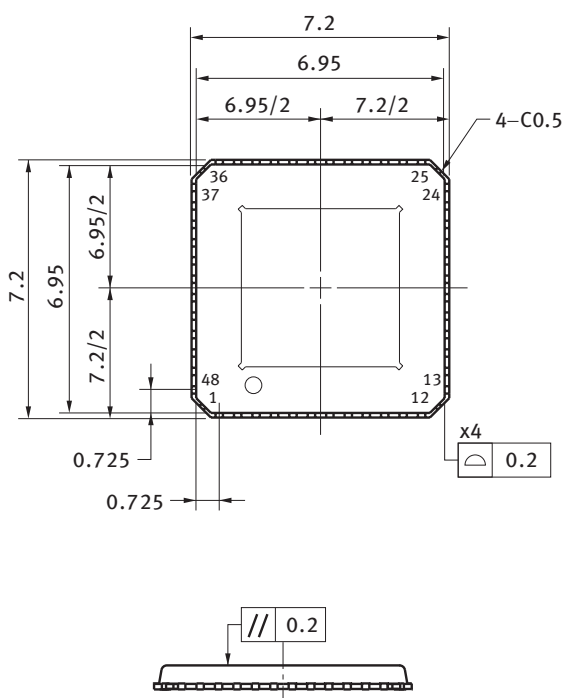
## Software driver

A generic driver applicable for various operating systems is in preparation.

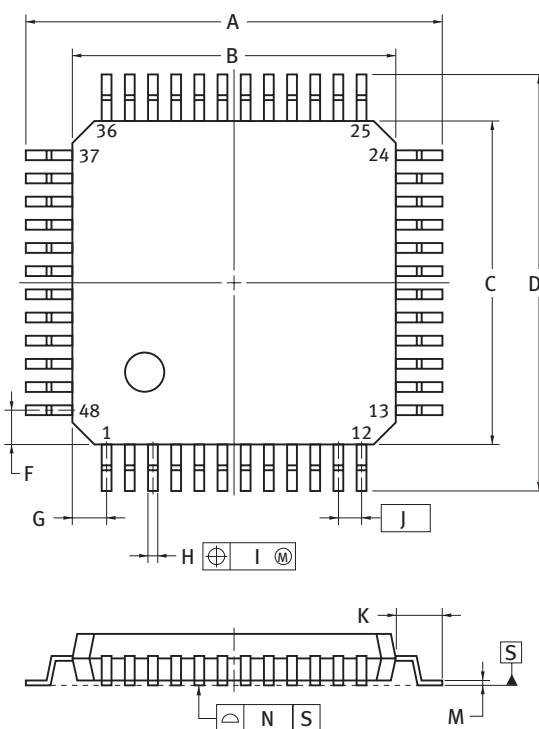
## Package lineup

- QFN48 – 7x7 mm, saw type with exposed pad
- LQFP48 – 7x7 mm, 0.5 mm pitch

### 48-PIN VQFN (7x7)



### 48-PIN PLASTIC LQFP (FINE PITCH) (7x7)



Before purchasing or using any Renesas Electronics products listed herein, please refer to the latest product manual and/or data sheet in advance.

