

TQM85xx & TQM83xx



The TQ Group - The entire world of electronics
The TQ Group is composed of TQ Systems, TQ Mechanics and TQ Components.

Founded in 1994, the system supplier TQ Systems develops and produces electronic modules and systems according to customer specifications. In the corporate family, TQ Mechanics is responsible for mechanical production. TQ Components markets embedded systems and industrial PCs developed and produced by TQ systems. The TQ Group has over 450 employees. Overall sales attained EUR51.2 million in business year 2004/2005.

TQ Components product line

One of the strengths of the company is self-developed embedded TQ modules. TQ offers an entire range of controllers: In addition to 16-bit and 32-bit Infineon modules, the product line includes a wide selection of Freescale and Intel-based processor boards. The modules are distinguished by their small size and long-term availability, and they satisfy high quality standards. TQ's aim remains industry-compatibility and longevity.

Another important pillar of the company is industrial PCs. They are distinguished by superior robustness and long-term availability. The space-saving mini-industrial PCs boast of a high degree of modularity. The customer can create individualized solutions without acquiring unnecessary product components.



Modular – it fits!

Operating system and tool partner for TQ modules



RTOS / Linux



C Compiler & RTOS / Euros



QNX SOFTWARE SYSTEMS

RTOS / QNX



RTOS / VXWorks



RTOS / OSE



Debugging Tools



THE POWER OF WE

RTOS / OS-9



RTOS / jbed



ITOX

TASKING

The Embedded Communications Company

RTOS

C Compiler



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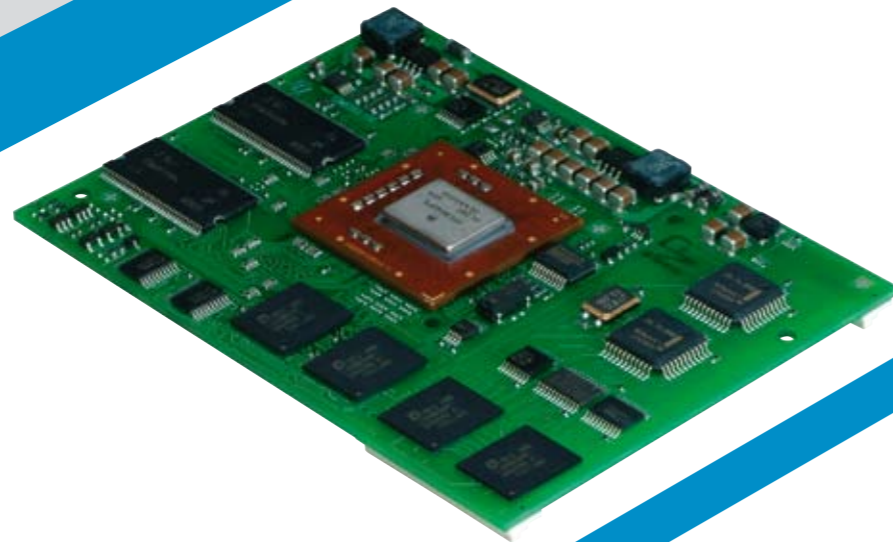
Data sheet TQM85XX, 83XX Rev.300 Document-No: TQM85XX, 83XX.DBD.300

EMBEDDED-MODULE

TQM85xx TQM83xx

32-bit Microprocessor MPC8xxx Familie





Performance without compromise

Equipped with the MPC8540, MPC8560, MPC8555 and MPC8548 PowerQUICC processor families, the TQM85xx TQ modules are built for high-performance industrial applications. The CPU performance of up to 1 GHz (soon 1.5 GHz) represents the high end of PowerPC-supported systems.

The superior CPU performance is supplemented by a very high memory bandwidth attained by the DDR SDRAM (dual data rate synchronous DRAM) connected with a 64 bit data bus width. With up to 512 Mbytes (1.5 GBytes with stacked DRAMs), the main memory offers sufficient space for even the most demanding applications.

A sufficient amount of persistent memory space is available from two flash banks and up to 128 MB memory. Developers can connect additional flash memory via the external system bus.

In the PowerQUICC line, the PowerQUICCI is the most complex processor of all with a wide variety of leading-edge functions and interfaces. The PowerQUICCI has approximately 2000 registers which places special demands on processor initialization. By using the TQM85xx modules with its pre-installed Monitor or UBOOT-SW, the user simplifies and accelerates application tasks.

The PowerQuicc processors by Freescale are distinguished by excellent communication performance. The TQM85xx module series takes full advantage of this strength: Every processor interface is available for communication. Of particular note are the Rapid I/O™ interfaces (500 MHz, 8-bit LVDS), 2 Gbit Ethernet interfaces, and the PCI / PCI-X interface.

In addition to these high-speed interfaces, there is a series of proven communication

paths that can be used to connect slower peripherals and for system management tasks: two RS232 interfaces and an I²C bus. Despite the extremely compact dimensions, the module accepts up to two external CAN controllers. In addition, the user has up to three FCC, two SCC and one JTAG interfaces at his disposal.

To allow developers to realize high-computation applications within minimum space, TQ Components optimized the TQM85xx modules to fit areas of only 77x75mm² (3.03x2.95 inch) or 100x75mm² (3.93x2.95 inch). Components were required with the smallest package size. The layout used the smallest possible structures. The microvia technique was used due to the complex processor housing with a 783 pin FC BGA package.

Tested for hard industrial use

The TQM 85xx embedded modules are designed for hard use in an industrial environment. In addition to the extended temperature range of -40°C...+85°C, long-lasting components tailored to industrial demands were consistently employed. To deal with shocks and vibrations and their effects, TQ Components uses the particularly stable 0.8 mm pitch mezzanine system connectors for all modules. This system also offers the option of different board spacing from 5 to 8 mm for maximum flexibility in module use.

Additional key features are the long-term availability and the scalability of the TQM 85xx within the family. The module design which remains physically and logically the same allows the customer to easily change to modules with greater or lesser performance.

Save time - save money – launch products faster

The PowerQuicCI processors offer extreme performance and make significant demands on the design. The TQM85xx modules can integrate three switching controllers to supply the CPU and peripherals. The TQ layout engineers had a difficult task in linking the DDR SDRAM within a very tight space. Very precise HF design specifications had to be observed when wiring the high-speed interfaces. These problems were solved by a 14-layer printed circuit board with a structural width of merely 80 µm and several microvia layers. In view of these extreme technical demands, it took a qualification process of several months to ensure the functionality of the modules. Good news for the user: The TQM85xx modules are just as easy to use as the other module families by TQ Components: A 3.3V power supply is all it takes to bring the module to life.

For fast and easy startup, TQ Components offers the Plug&Play starter kit STK 85xx. The starter kit supports all TQM85xx modules. The immediate module startup saves the developer valuable time for implementing processor hardware in the actual product which can hence be launched faster and cheaper on the market. The Starterkit can be delivered with preinstalled LINUX, kernel version 2.6.

Of major benefit is the availability of PowerQUICCI processor signals and interfaces in the application. As is the case with all TQ minimodules, all relevant processor signals are made available in the system connector for the application.

In addition, the starter kit circuit diagrams are freely available. Customers can hence access tested circuit components for the most important interfaces. The software compatibility of our starter kits then becomes a highly welcome byproduct.

Changes to the processor that are to be expected while it is being launched therefore do not influence the basic application board and only necessitate a module redesign. This saves major time and money in the application. It also allows the system to be scaled.

The TQM85xx modules support all conventional tools such as compilers, debuggers and emulators. All relevant operating systems that are available to the PowerQUICCI processor also run on the embedded modules of the TQM 85xx series.

Overall, the use of the TQ minimodules allows the customer to significantly shorten development cycles and eliminate a whole series of developmental risks. The module interfaces that remain stable over many years enable the customer to leave the design unchanged over a long period.

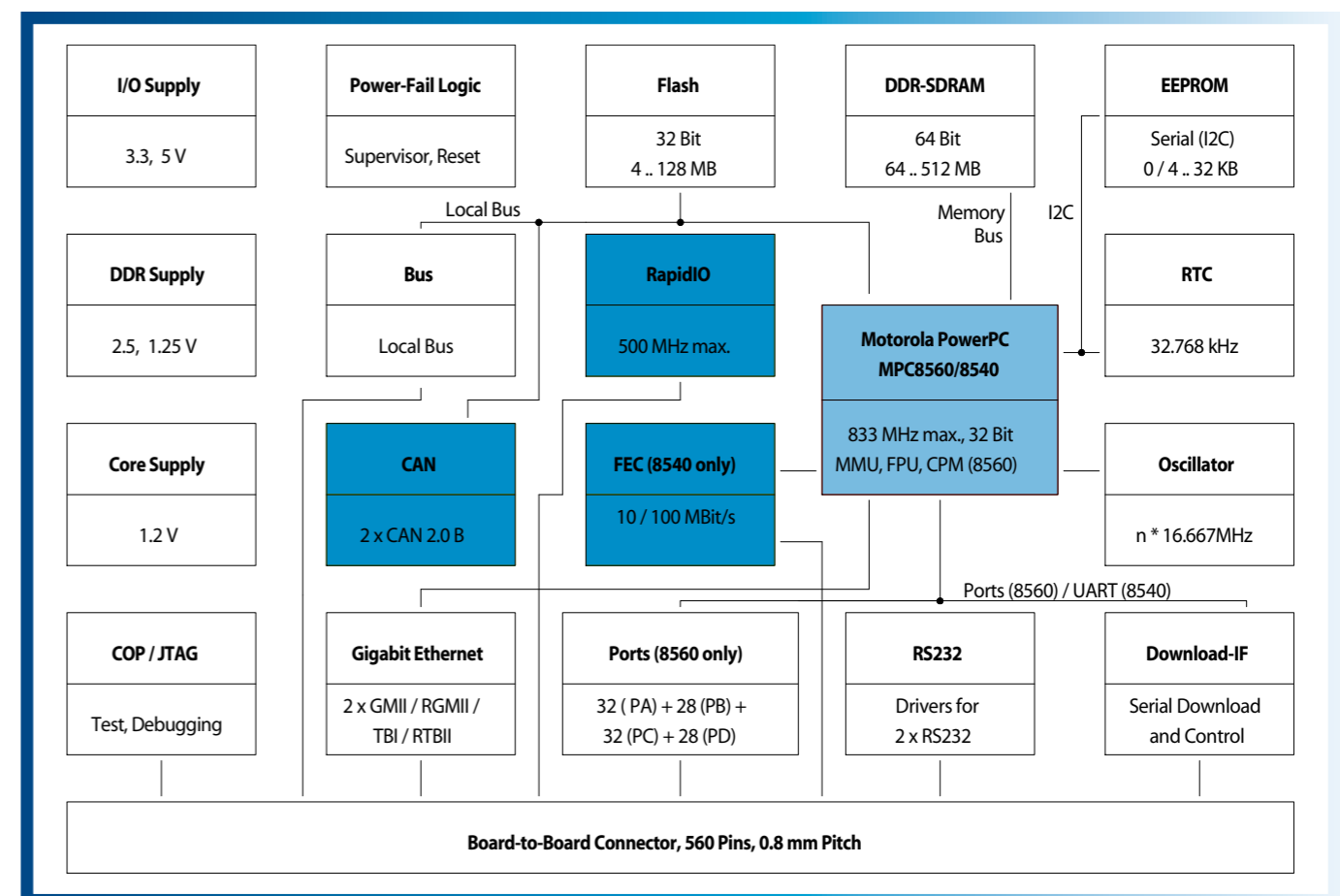
Highlights

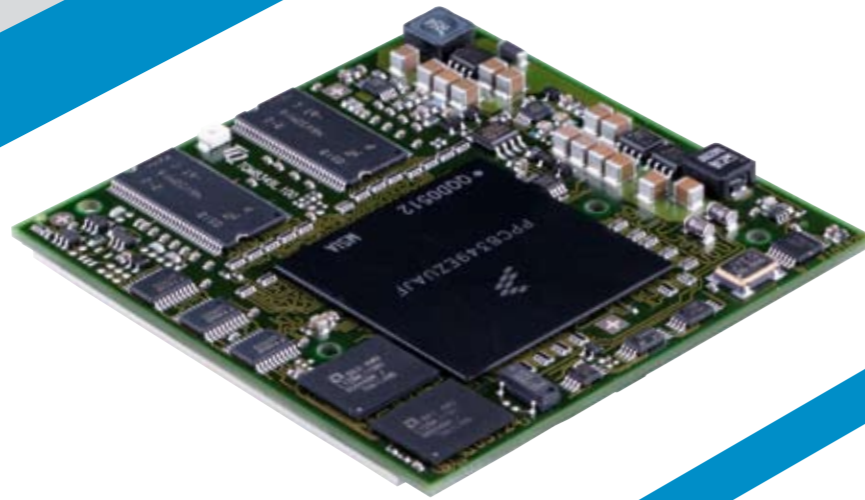
TQM85xx

- 2 Gigabit Ethernet-Interface
- 500 MHz Rapid I/O
- PCI / PCI-X
- Up to 1.5 GHz CPU Clock
- Up to 1.5 GByte of DDR-SDRAM
- Up to 128 MB Flash

Block diagram

TQM85xx





TQM83xx – Communications processor module of the next generation

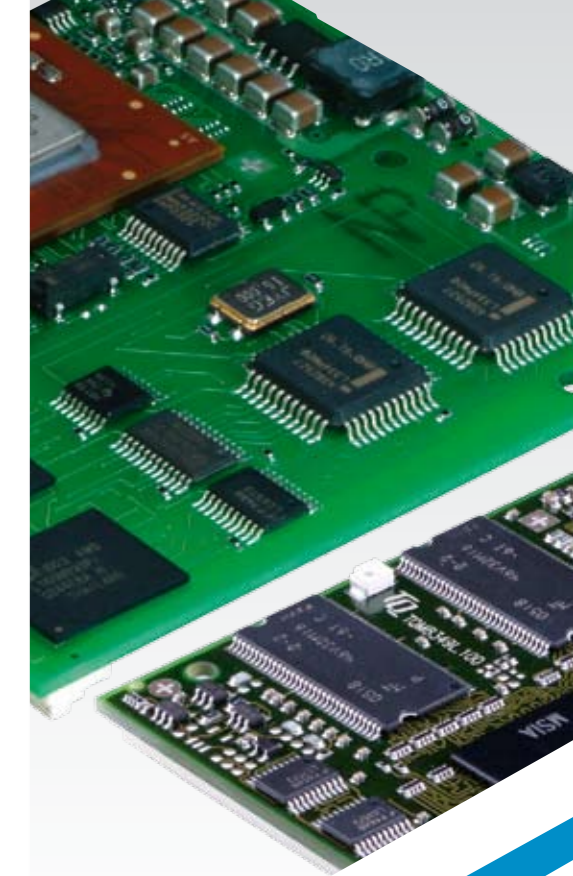
With its TQM83xx embedded module family, TQ Components offers the latest in PowerPC-based modules. The communications performance is supported by powerful functions: Dual gigabit Ethernet, high-speed USB, a security engine and the new double-precision floating point unit.

The very compact 77 x 75 mm² embedded module has space for up to 2 GB DDR SDRAM, up to 128 MB flash memory, and up to 32 KB EEPROM. On the first level, MPC8347E and MPC8349E processors are on the modules. The TQM83xx modules are pin-compatible with high-end modules of the TQM85xx family. The user is able to select from a wide

range of modules and build flexible and simple products with various performance features. Only one mainboard design is required with a selection of the appropriate modules of the TQM85xx and TQM83xx families.

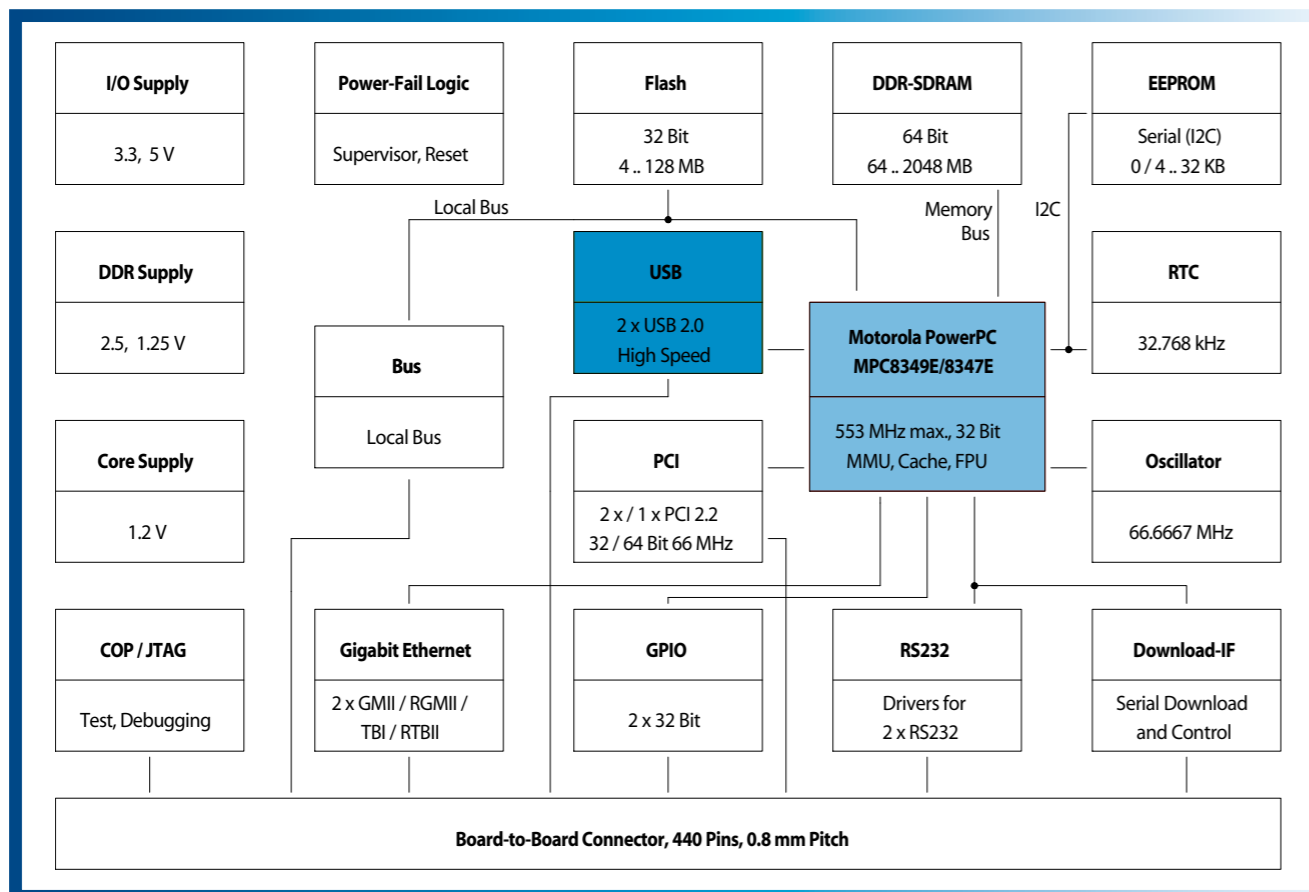
The 32-bit MPC8347/49 processors attain a computational speed of up to 1260 MIPS at a frequency of 667 MHz. The integrated e300 core is an expanded version of the 603e PowerPC core.

A highlight: The two gigabit Ethernet interfaces for super fast network connections. In addition to the fast core, the interface functionality is one of the outstanding features of this product family. Dual PCI, PCI-X, Hi-Speed USB, dual UART, SPI, GPIOs, and Dual I²C cover the interfaces needed for industrial and telecommunication applications. The security coprocessor is responsible for data transmission safety. The engine supports diverse encoding algorithms: DES, 3DES, MD-5, SHA-1, AES and ARC-4. It meets Ipsec and IEEE802.11i standards for security protocols. The embedded modules, the starter kit and a wide variety of tool software are available immediately.



Block diagram

TQM83xx



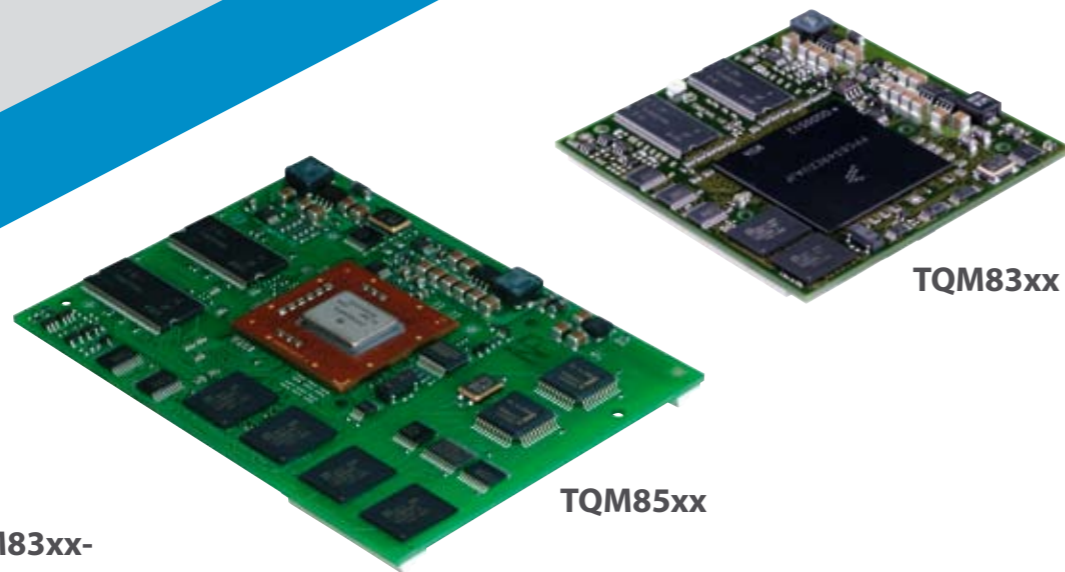
Customer benefit:

- The small size of the module simplifies integration in tight spaces.
- Very low energy use enables a simple, passive cooling approach.
- The security engine prevents unauthorized access to transmitted data
- All conventional embedded operating systems can be completely incorporated in Flash memory up to 128 MB. The module therefore does not need any external storage media to boot up.
- The EEPROM can be used for storing process data. This relieves the Flash with its limited number of possible write-cycles.
- Almost any peripheral module can be easily connected via the PCI busses. Of course, the PCI bus can also be used purely for communication, for example between several CPUs.
- Also worth mentioning: The external RTC offers an alarm output and can be buffered with a small battery on the base board.

Examples of uses:

- By taking advantage of the options for large (and fast DDR) memory expansion and fast Ethernet interfaces, you can, for example create very powerful routers. (access to memory-resident routing tables is also very fast).
- The module is also suitable for applications such as wireless LAN, copiers/printers/image processing,..
- Industrial controls





TQM85xx/TQM83xx-

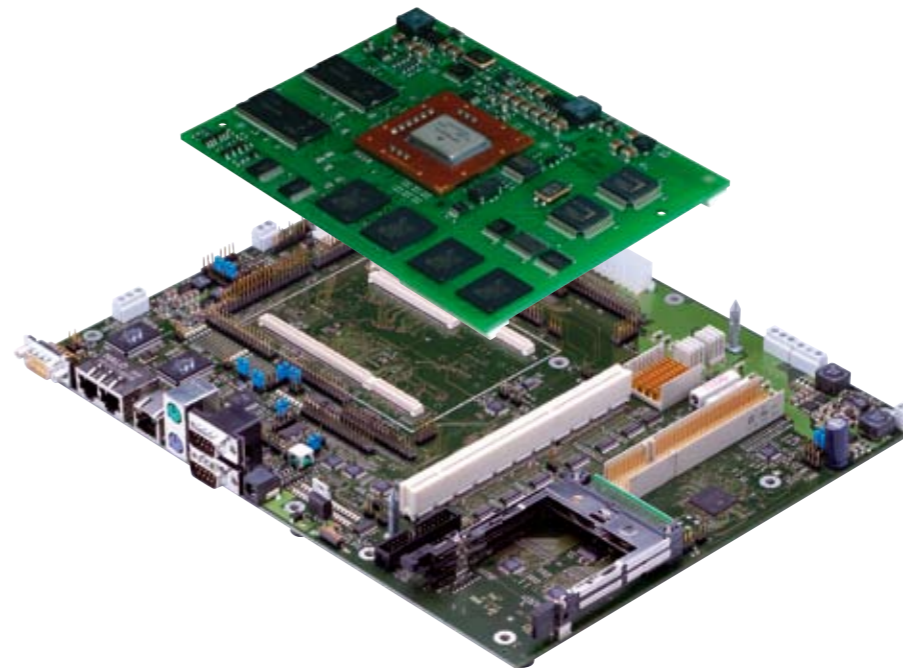
Family

Modul	TQM8540 TQM8560	TQM8541 TQM8555	TQM8548	TQM8347L TQM8349L
Microprocessor Type	MPC8540 MPC8560	MPC8541 MPC8555	MPC8548	MPC 834xE
CPU Clock / MHz	up to 1000		up to 1500	up to 667
CPM Clock/ MHz	* / 333	* / 333	*	*
Core	e500			e300
I-Cache/D-Cache /KB	32 KB / 32 KB			
Integrated L2 Cache / KB	256 KB		512	*
Integrated Security Engine	no		yes	
Memory / Bus Speed / MHz	166 / 333		333 / 667	333 / 133
Power Fail / Watch Dog	yes			
Memory				
DDR-SDRAM / MB	32 - 512	32 - 512(1.5 GB)	32 - 512(1.5 GB)	64 - 512(1.5 GB)
Flash /MB	4 - 256		4-512(3)	4 - 128
EEPROM (I ² C Bus)	0 - 32 kB			
Interface				
Serial	2x RS-232			
CAN	2x 82527 optional			no
CPM Signals	* / all	* / all	*	*
Ethernet (10/100)	up to 3	up to 2	*	*
Ethernet (10/100/1000)	2		4	2
PCI Interface	1x32/64-bit	2x32-bit or 1x64-bit	1x32/64-bit	up to 2 x 32 bit or 1x64-bit
PCI-X Interface	yes	no	yes	no
I ² C Controller	1 / 2	2	2	2
UTOPIA Level II Ports	* / 2	* / 2	*	*
Multichannel HDLC	* / up to 256	* / up to 64	*	*
RTC	yes			
RapidIO-Interface	parallel	no	serial x4 / x1	no
General				
Supply	3.3 V			
Temperature Range	0°C...+70°C / optional -40...+85°C on request			
System Connector	0.8 mm pitch			
Pin Number	560	600	440	
Dimension	100 x 75 mm ²		77 x 75 mm ²	
Starterkit	STK85xx			
Availability	available	available Q1/06	available Q3/06	available Q1/06
* = not applicable				
(1) integrated QUICC Engine				
(2) up to 2GB with stacked DDR SDRAM				
(3) up to 2GB additional NAND-flash				
#) reliminary facts; developmentally status				

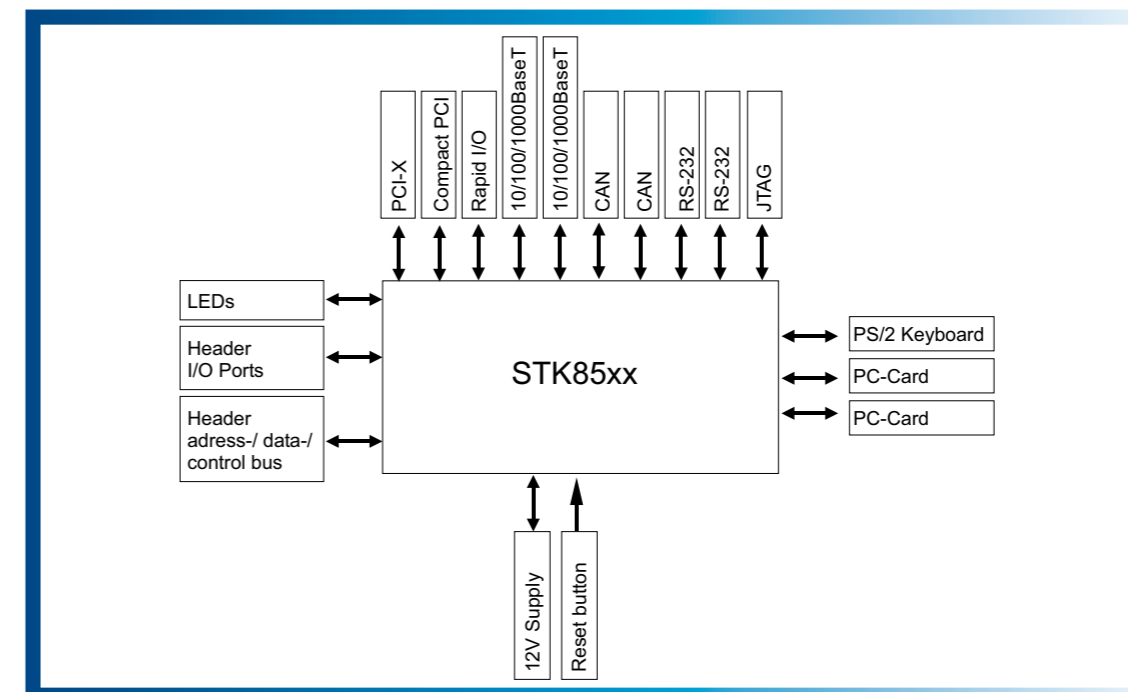
**Plug&Play Starterkit
STK85xx**

The development system is distinguished by the fast and easy startup of the TQM85xx/83xx module with the STK85xx starter kit. Developers can quickly develop and test their software directly on the module. There is now nothing in the way of quickly realizing the application and the finished product. The STK85xx development tool with the TQM85xx/83xx enables fast development cycles, concentrating on actual business services and quicker market introduction.

**Implementing board for
TQM85xx and TQM83xx Modules**



**Block diagram
STK85xx**



**Capability characteristics
STK85xx**

- For all TQM85xx/83xx Modules
- 2x RS-232 interface (Sub-D)
- 10BaseT interface (RJ45)
- 100BaseT interface (RJ45)
- 2x GigaBit Ethernet (1000BaseT)
- 2x CAN
- PCI/PCI-X
- Rapid I/O
- PC-Card
- Keyboard
- JTAG / BDM interface
- Lauterbach Trace
- Reset button
- Port A LEDs
- Header for port signals
- Dimension: 205 x 130 mm² (8.07 x 5.12 square inch)

Software

- Preinstalled MONITOR or
- Preinsatllid UBOOT with LINUX 2.6

Accessories

- TQM85xx or TQM83xx with STK85xx
- Power supply unit
- Serial download cable
- On-board monitor software
- MOZI85xx pull tool