

TX module quick selection guide



	TX25	TX28/TX28S	TX48	TX53-80/81	TX53-1331	TX6U-8010	TX6Q-10/11
CPU	i.MX257	i.MX287/i.MX283	AM3354	i.MX537	i.MX535	i.MX6U7	i.MX6Q5
Maximum Clock	400MHz	454MHz	720MHz	800MHz	1.2GHz	800MHz	1GHz
Core	ARM926EJ-S	ARM926EJ-S	Cortex-A8	Cortex-A8	Cortex-A8	Dual Cortex-A9	Quad Cortex-A9
Main Memory	64MB	128MB/64MB	256MB	512MB	1GB	1GB	1GB
Type	SDRAM	DDR2	DDR3	DDR3	DDR3	DDR3	DDR3
Main memory bus width	16 bit	16 bit	16 bit	32 bit	32 bit	64 bit	64 bit
NAND Flash	128MB	128MB	128MB	128MB	128MB	128MB	128MB
Power supply / PMIC	fixed	integrated	LTC3589	LTC3589	LTC3589	LTC3676	LTC3676
Real Time Clock (RTC)	-	DS1339/-	DS1339	DS1339	DS1339	DS1339	DS1339
Res. Touch Screen Controller	yes	yes	yes	-	-	-	-
Size	26mm	26mm	26mm	31mm	31mm	31mm	31mm
Temperature range	-40..85°C	-40..85°C/0..70°C	-40..85°C	-40..85°C	-20..70°C	-40..85°C	-20..70°C
Power consumption (bootloader prompt)	0,8W	0,8W/1W	1W	1,3W	1,3W	2,5W	2,5W
Processor grade	industrial	industrial	industrial	industrial	consumer	industrial	consumer
Industrial interfaces							
CAN	2	2/-	2	2	-	2	2
UARTs	5	6	6	5	5	5	5
IEEE1588 support	-	yes/-	yes	yes	-	yes	yes
Display and multimedia features							
max. recommended LCD resolution	VGA 640x480	WVGA 800x480	WXGA 1366x768	WXGA 1366x768	UXGA 1080p 1600x1200	WUXGA 1080p 1920x1200	4XGA 1080p 2048x1536
Graphics Acceleration			yes	yes	yes	yes	yes
Video Codec	-	-	-	yes	yes	yes	yes
CMOS camera interface	1	-	-	2	2	2	2
LCD interface	18bit	24bit	24bit	24bit/LVDS	LVDS	24bit/LVDS	24bit/LVDS
Analog RGB out / PCI Express	-	-	-	RGB out	RGB out	PCIe v2.0	PCIe v2.0
Common TX features							
10/100 Ethernet	1	2/1	2	1	1	1	1
USB ports	2	2	2	2	2	2	2
I2C / SPI	yes	yes	yes	yes	yes	yes	yes
SD interface	1	1	1	2	2	2	2
Serial audio ports	2	2/1	1	2	2	2	2
Special features							
External memory interface	8 bit	-	-	16 bit	16 bit	16 bit	16 bit
SATA	-	-	-	- / yes	yes	-	- / yes

Computer On Module

- Processor Freescale i.MX 6Quad, 1GHz
- RAM 1GB DDR3 SDRAM 64-bit
- ROM 128MB NAND Flash
- Power supply Single 3.1V to 5.5V
- Size 31mm SO-DIMM
- Temp.-Range -20°C..70°C (Extended Consumer)

Key Features

- 10/100Mbps Ethernet
- Two High Speed USB 2.0 ports
- Full HD LCD controller, 24bpp
- OpenGL ES 2.0 and OpenVG 1.1 hardware accelerators
- Multi-format HD 1080p60 video decoder and 1080p30 encoder hardware engine
- Two Camera Interfaces
- NEON MPE coprocessor
 - SIMD Media Processing Architecture
 - dual, single-precision floating point execute pipeline
- Unified 1MB L2 cache
- Several interfaces:
 - 3x UART, 2x SDIO, 2x SSI/AC97/I2S, I2C, CSPI, Keypad, Ext. Memory I/F
- 3.3V I/O
- IEEE1588 support
- 2x Controller Area Network (FlexCAN)
- PCIe 2.0 (1-lane)

LVDS Option only:

- Dual LVDS display port
- SATA

OS Support

- Windows Embedded Compact 7
- Linux
- Android by kernel concepts www.kernelconcepts.de
- QNX by SITRE www.sitre.fr

Development System

- Starter-Kit V



**Quad
Cortex A9**

Board highlights:

- Highly integrated
- Standard TX-DIMM pinout
- as small as possible - only 31mm
- 3.3V I/O

The TX6 is a member of the TX module series, specially designed for Freescale i.MX multimedia processors. TX modules are complete computers, implemented on a board smaller than a credit card, and ready to be designed into your embedded system. TX modules includes a Freescale® i.MX processor, SDRAM and Flash memory. The integrated LCD-controller enables direct connection of an LCD screen. The TX6 is specifically targeted at embedded applications where size, high cpu-performance and cost are critical factors.

Computer on module

- Freescale® i.MX 6Quad up to 1 GHz
- 1GByte SDRAM (64bit) DDR3-1066
- 128 MByte NAND Flash memory
- DIMM200-module (67,6mm x 31 mm x 4mm)
- Operating temperature ranges (Processor junction temperature)
 - Extended Consumer Grade: -20°C ..105°C
 - Industrial Grade: -40°C ..105°C
 - Automotive Grade: -40°C ..125°C

Processor

The i.MX 6Dual and i.MX 6Quad processors represent Freescale Semiconductor's latest achievement in integrated multimedia applications processors. These processors are part of a growing family of multimedia-focused products that offer high performance processing and are optimized for lowest power consumption. The i.MX 6Dual and i.MX 6Quad processors feature Freescale's advanced implementation of the quad ARM Cortex™-A9 core, which operates at speeds up to 1 GHz. They include 2D and 3D graphics processors, 3D 1080p video processing, and integrated power management. Each processor provides a 64-bit DDR3/LVDDR3/LPDDR2-1066 memory interface and a number of other interfaces for connecting peripherals, such as WLAN, Bluetooth™, GPS, hard drive, displays, and camera sensors.

High Performance CPU : ARM Quad Cortex-A9

- ARM Cortex-A9, with ARMv7™, Neon, VFPv3 and Trustzone support
- 32K instruction and data L1 caches and 256 KB to 1 MB of L2 cache
- Multi-stream-capable HD video engine delivering 1080p60 decode, 1080p30 encode and 3D video playback in HD in high performance families
- Superior 3D graphics performance with up to quad shaders performing 200 MT/s
- Separate 2D and/or Vertex acceleration engines for an optimal user interface experience
- Stereoscopic image sensor support for 3D imaging

Standard TX-DIMM pinout:

- 4-wire UARTs (x3)
- LCD
- I2C / PWM
- Serial Audio Interfaces (x2)
- 4-wire SD-Card/SDIO

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- 480 Mbps USB OTG (Host or Device)
- 480 Mbps USB Host

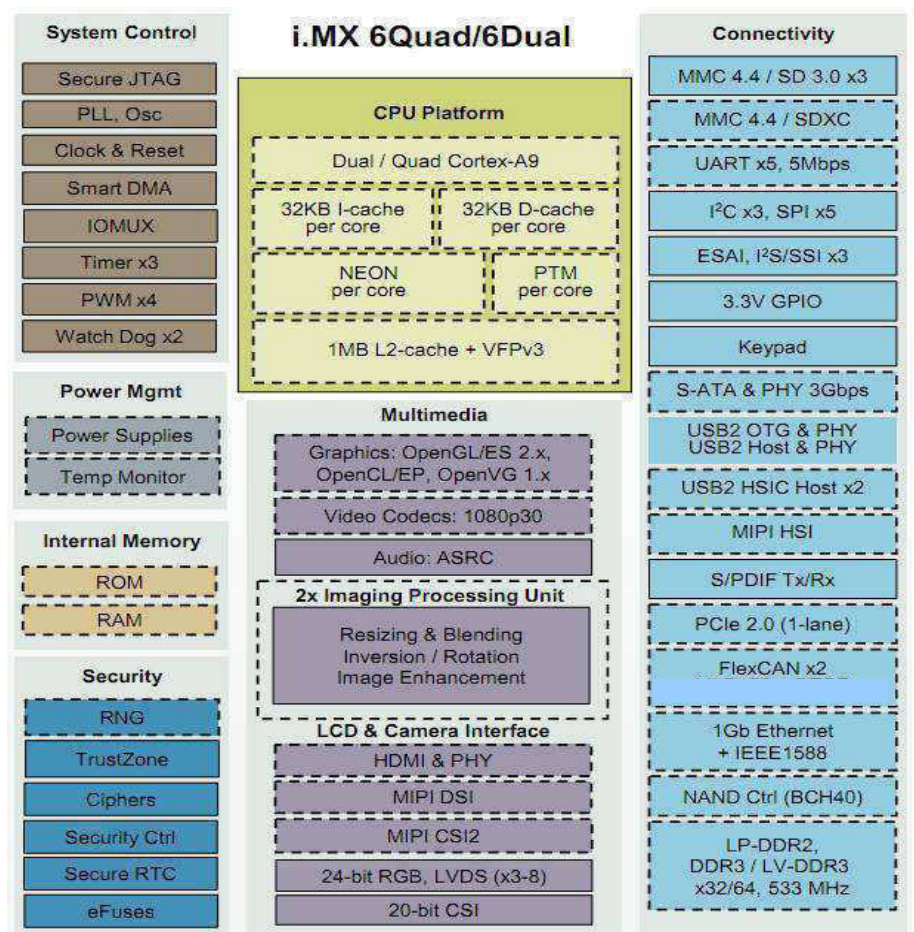
Power Supply

The TX6 accepts an input voltage from various sources:

- 1-cell Li-Ion/Polymer (3.1V to 4.2V)
- 5.0V USB supply or AC wall adapter
- 3.3V

Read more in our TX-Guide:

www.karo-electronics.com/TX-Guide



Order Number	CPU	SDRAM	Flash	Temp. Grade
TX6Q/1000/1024S/128F	1GHz MCIMX6Q5 Quad Core Consumer	1024MB	128MB	Extended Consumer
TX6Q/1000/1024S/128F/LVDS	1GHz MCIMX6Q5 Quad Core Consumer	1024MB	128MB	Extended Consumer

Computer On Module

- Processor Freescale i.MX 6 Dual Lite, 800MHz
- RAM 512MB / 1GB DDR3 SDRAM
- ROM 128MB NAND Flash
- Power supply Single 3.1V to 5.5V
- Size 31mm SO-DIMM
- Temperature Grade Industrial
(-40°C to 105°C Tj)

Key Features

- 10/100Mbps Ethernet
- Two High Speed USB 2.0 ports
- Full HD LCD controller, 24bpp
- OpenGL ES 2.0 hardware accelerator
- Multi-format HD 1080p60 video decoder and 1080p30 encoder hardware engine
- Two Camera Interfaces
- NEON MPE coprocessor
 - SIMD Media Processing Architecture
 - dual, single-precision floating point execute pipeline
- Unified 1MB L2 cache
- Several interfaces:
 - 3x UART, 2x SDIO, 2x SSI/AC97/I2S,
 - I2C, CSPI, Keypad, Ext. Memory I/F
- 3.3V I/O
- IEEE1588 support
- 2x Controller Area Network (FlexCAN)
- PCIe 2.0 (1-lane)

LVDS Option only:

- Dual LVDS display port

OS Support

- Windows Embedded Compact 7
- Linux
- Android by kernel concepts www.kernelconcepts.de
- QNX by SITRE www.sitre.fr

Development System

- Starter-Kit V



**Dual
Cortex A9**

Board highlights:

- Highly integrated
- Standard TX-DIMM pinout
- as small as possible - only 31mm
- 3.3V I/O

The TX6 is a member of the TX module series, specially designed for Freescale i.MX multimedia processors. TX modules are complete computers, implemented on a board smaller than a credit card, and ready to be designed into your embedded system. TX modules includes a Freescale® i.MX processor, SDRAM and Flash memory. The integrated LCD-controller enables direct connection of an LCD screen. The TX6 is specifically targeted at embedded applications where size, high cpu-performance and cost are critical factors.

Computer on module

- Freescale® i.MX Dual Lite up to 800 MHz
- 512 Mbyte (32bit) / 1GByte (64bit) SDRAM DDR3-800
- 128 Mbyte NAND Flash memory
- DIMM200-module (67,6mm x 31 mm x 4mm)
- Operating temperature ranges (Processor junction temperature)
 - Extended Consumer Grade: -20°C ..105°C
 - Industrial Grade: -40°C ..105°C
 - Automotive Grade: -40°C ..125°C, AEC-Q100 Grade 3

Processor

The i.MX 6Dual Lite processors represent Freescale Semiconductor's latest achievement in integrated multimedia applications processors. These processors are part of a growing family of multimedia-focused products that offer high performance processing and are optimized for lowest power consumption. The i.MX 6Dual Lite processors feature Freescale's advanced implementation of the dual ARM Cortex™-A9 core, which operates at speeds up to 1 GHz. They include 2D and 3D graphics processors, 3D 1080p video processing, and integrated power management. Each processor provides a 64-bit DDR3/LVDDR3/LPDDR2-800 memory interface and a number of other interfaces for connecting peripherals, such as WLAN, Bluetooth™, GPS, hard drive, displays, and camera sensors.

High Performance CPU : ARM Dual Cortex-A9

- ARM Cortex-A9, with ARMv7™, Neon, VFPv3 and Trustzone support
- 32K instruction and data L1 caches and 256 KB to 1 MB of L2 cache
- Multi-stream-capable HD video engine delivering 1080p60 decode, 1080p30 encode and 3D video playback in HD in high performance families
- Superior 3D graphics performance with a shader performing up to 50 MT/s. Separate 2D and/or Vertex acceleration engines for an optimal user interface experience
- Stereoscopic image sensor support for 3D imaging

Standard TX-DIMM pinout:

- 4-wire UARTs (x3)
- LCD
- I2C / PWM
- Serial Audio Interfaces (x2)
- 4-wire SD-Card/SDIO

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- 480 Mbps USB OTG (Host or Device)
- 480 Mbps USB Host

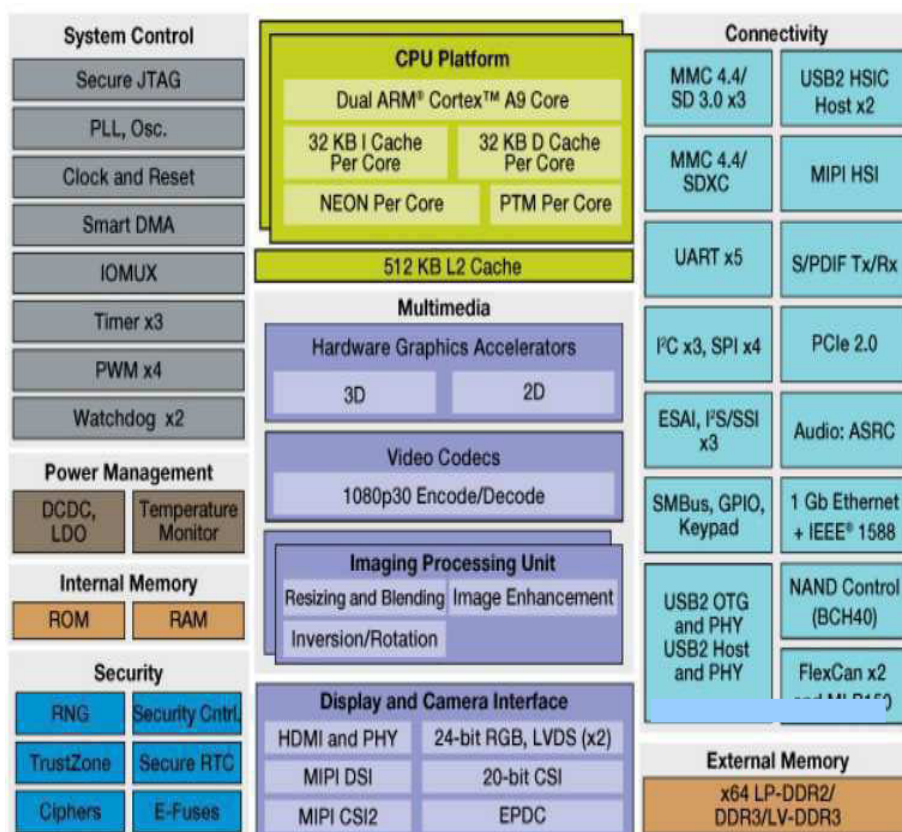
Power Supply

The TX6 accepts an input voltage from various sources:

- 1-cell Li-Ion/Polymer (up to 4.2V)
- 5.0V USB supply or AC wall adapter
- 3.3V

Read more in our TX-Guide:

www.karo-electronics.com/TX-Guide



Order Number	CPU	SDRAM	Flash	Temp. Grade
TX6DL/800/512S/128F/I	800MHz MCIMX6U7 Dual Core Industrial	512MB	128MB	Industrial
TX6DL/800/1024S/128F/I	800MHz MCIMX6U7 Dual Core Industrial	1024MB	128MB	Industrial

Computer On Module

- Processor Freescale i.MX537, 800 MHz
Freescale i.MX535, 1 GHz / 1.2GHz
- RAM 512MB/1GB DDR3 SDRAM
- ROM 128MB NAND Flash
- RTC DS1339 Real Time Clock
- Power supply Single 3.1V to 5.5V
- Size 31mm SO-DIMM
- Temp.-Range -20°C..70°C (i.MX535 commercial)
-40°C..85°C (i.MX537 industrial)

Key Features

- 10/100Mbps Ethernet
- Two High Speed USB 2.0 ports
- LCD controller up to 1600 x 1200, 24bpp
- OpenGL ES 2.0 and OpenVG 1.1 hardware accelerators
- Multi-format HD 1080p video decoder and 720p video encoder hardware engine
- Two Camera Interfaces
- NEON SIMD media accelerator
- Unified 256KB L2 cache
- Vector Floating Point Unit
- Several interfaces:
3x UART, 2x SDIO, 2x SSI/AC97/I2S, I2C, CSPI, Keypad, Ext. Memory I/F
- 3.3V I/O

i.MX537 only:

- IEEE1588 support
- Two CAN interfaces

LVDS Option only:

- Dual LVDS display port
- SATA

OS Support

- Windows Embedded Compact 7
- Linux

Development System

- Starter-Kit V



**1.2 GHz
Cortex A8**

Board highlights:

- Highly integrated
- Industrial temperature range (i.MX537 only)
- Standard TX-DIMM pinout
- as small as possible - only 31mm
- 3.3V I/O

The TX53 is a member of a module series, specially designed for Freescale i.MX multimedia processors. TX modules are complete computers, implemented on a board smaller than a credit card, and ready to be designed into your embedded system. TX modules includes a Freescale® i.MX processor, SDRAM and Flash memory. The integrated LCD-controller enables direct connection of an LCD screen. The TX53 is specifically targeted at embedded applications where size, high cpu-performance and cost are critical factors.

Computer on module

- Freescale® i.MX535, 1.2 GHz / i.MX537, 800 MHz
- 512 MByte/1GByte SDRAM (32bit) (up to 2GB on request)
- DDR3-800
- 128 MByte NAND Flash memory
- DIMM200-module (67,6mm x 31 mm x 3,6mm)
- Industrial i.MX537 / Commercial i.MX535
- Operating temperature range -20..70°C / -40°C..85°C

Processor

The i.MX53 family of processors represents Freescale's next generation of advanced multimedia and power-efficient implementation of the ARM Cortex™-A8 core. The i.MX53, prepares your end device for tomorrow's smart mobile technology today. The i.MX53 enables hours of full HD 1080p video playback and an amazing Adobe® Flash® 10.1 experience. With core processing speeds up to 1 GHz as well as a high level of integration, the i.MX53 enables a great user experience at a lower retail price point.

High Performance CPU : ARM Cortex-A8 up to 1GHz

- OpenGL® ES 2.0 and OpenVG™ 1.1 hardware accelerators
- Multi-format HD1080p video decoder and HD720p video encoder hardware engine
- Dual display capable with multiple display options including TFT LCD, LVDS, analog TV-formats (composite, component, RGB) and standard VGA
- Hardware accelerated image post-processing, display quality enhancement, and video and graphics combining
- Two simultaneous camera inputs with hardware pre-processing
- Dual USB 2.0 Controllers (HS OTG, HS Host) with integrated PHY
- Two additional High-Speed USB 2.0 controllers
- 10/100 Ethernet controller with IEEE1588 time-stamping
- Wide array of serial interfaces including SDIO, SPI, I2C, UART
- Security solution supporting High Assurance Boot, Cipher and random number generator accelerators, and Tamper Detection

Standard TX-DIMM pinout:

- 4-wire UARTs (x3)
- LCD
- I2C / PWM
- Serial Audio Interfaces (x2)
- 4-wire SD-Card/SDIO

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- 480 Mbps USB OTG (Host or Device)
- 480 Mbps USB Host

Additional interfaces like CAN, 2 UARTs and external memory interface are available on TX53 specific pins. Some interfaces are multiplexed with other functions.

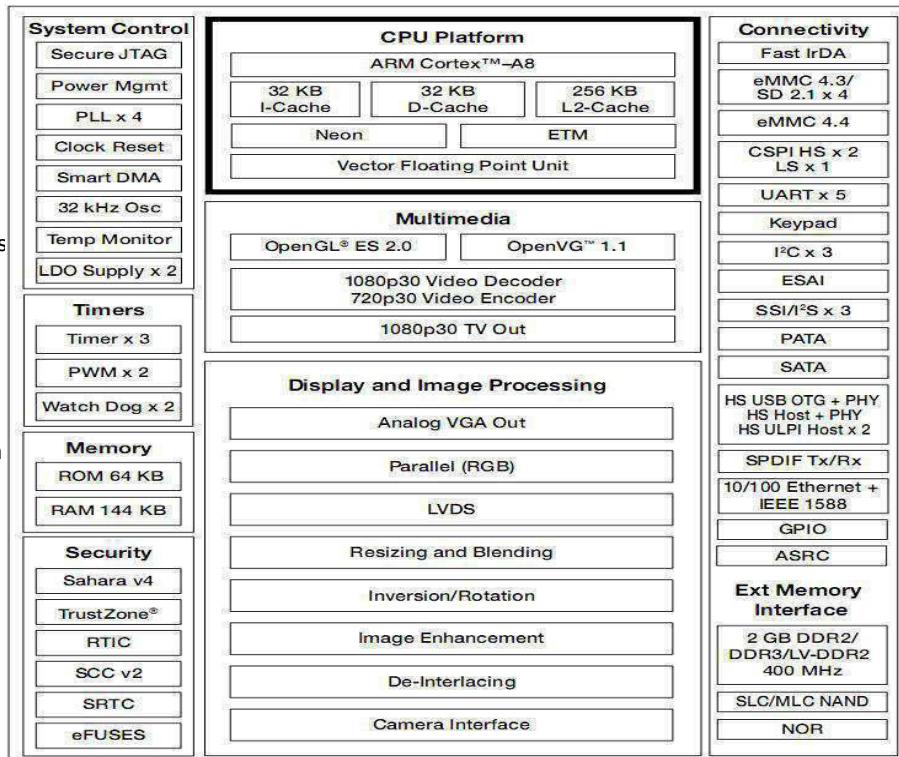
Power Supply

The TX53 accepts an input voltage from various sources:

- 1-cell Li-Ion/Polymer (3.1V to 4.2V)
- 5.0V USB supply or AC wall adapter
- 3.3V

Read more in our TX-Guide:

www.karo-electronics.com/TX-Guide



Ordering Information

Order Number	CPU	SDRAM	Flash	Temp.
TX53/1200/1024S/128F/LVDS	1.2GHz i.MX535	1024MB	128MB	-20°C..70°C
TX53/1000/512S/128F	1GHz i.MX535	512MB	128MB	-20°C..70°C
TX53/800/512S/128F/I	800MHz i.MX537	512MB	128MB	-40°C..85°C
TX53/800/512S/128F/LVDS/I	800MHz i.MX537	512MB	128MB	-40°C..85°C

Computer On Module

- Processor TI Sitara™ AM3354
720 MHz ARM® Cortex™-A8
- RAM 256MB DDR3 SDRAM
- ROM 128MB NAND Flash
- RTC DS1339 Real Time Clock
- Power supply Single 3.1V to 5.5V
- Size 26mm SO-DIMM
- Temp.-Range -40°C..85°C

Key Features

- 10/100Mbps Ethernet
- Two High-Speed USB 2.0 ports
- True colour LCD controller
- Two CAN interfaces
- 4/5 wire Touchscreen interface
- Several peripheral interfaces:
UART, SD-CARD, I2C, PWM, Serial Audio, SPI
- Power management optimized for long battery life
- 3.3V I/O

OS Support

- Windows® Embedded Compact 7
- Linux

Development System

- Starter-Kit V



**720 MHz
Cortex™-A8**



TEXAS INSTRUMENTS

Board highlights:

- Lowest cost 720MHz Cortex™-A8
- Industrial temperature range
- Standard TX-DIMM pinout
- as small as possible - only 26mm

TX modules are complete computers, implemented on a board smaller than a credit card, and ready to be designed into your embedded system.

The TX-48 is pin compatible with all TX modules. This approach has the advantage of providing the developer with the potential for creating scalable systems. All modules can be supplied with the same hardware reference platform that supports both Linux and Microsoft Windows® Embedded.

Computer on module

- TI Sitara™ AM3354 720 MHz ARM® Cortex™-A8
- 256 MByte DDR3 SDRAM (16bit)
- 128 MByte NAND Flash memory
- DIMM200-module (67,6mm x 26 mm x 3,6mm)
- Operating temperature range -40..85°C

Sitara™ AM335x Processor for Industrial Applications

The AM335x processors based on the ARM® Cortex™-A8 are enhanced with image, graphics processing, peripherals and industrial interface options such as EtherCAT.

AM335x processors are broad market application processors with image, graphics processing, and peripherals.

The AM335x processor contains these subsections:

- Microprocessor unit (MPU) subsystem based on the ARM® Cortex™-A8 processor
- POWERVR® SGX Graphics Accelerator Subsystem for 3D graphics acceleration to support display and gaming effects.
- Programmable Real-time Unit (PRU) subsystem enables the user to create a variety of digital resources beyond native peripherals of the device. In addition, the PRU is separate from the ARM core. This allows independent operation and clocking to give the device greater flexibility in complex system solutions.
- High performance interconnects provide high-bandwidth data transfers for multiple initiators to the internal and external memory controllers and to on-chip peripherals. The device also offers a comprehensive clock-management scheme.
- The on-chip analog to digital converter (ADC) can be coupled with the LCD controller to provide an integrated touch screen solution. In addition, the ADC can be used in combination with the pulse width module to create a closed loop motor control solution.
- Real-time Clock (RTC) provides a clock reference on a separate power domain. This enables battery backed clock reference.

Standard TX-DIMM pinout:

- 4-wire UARTs (x3)
- LCD
- I2C / PWM
- Serial Audio Interfaces (x2)
- 4-wire SD-Card/SDIO

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- 480 Mbps USB OTG
- 480 Mbps USB Host

Additional interfaces like CAN, 4/5-wire resistive touch-screen, 2 UARTs are available on TX48 specific pins. Some interfaces are multiplexed with other functions.

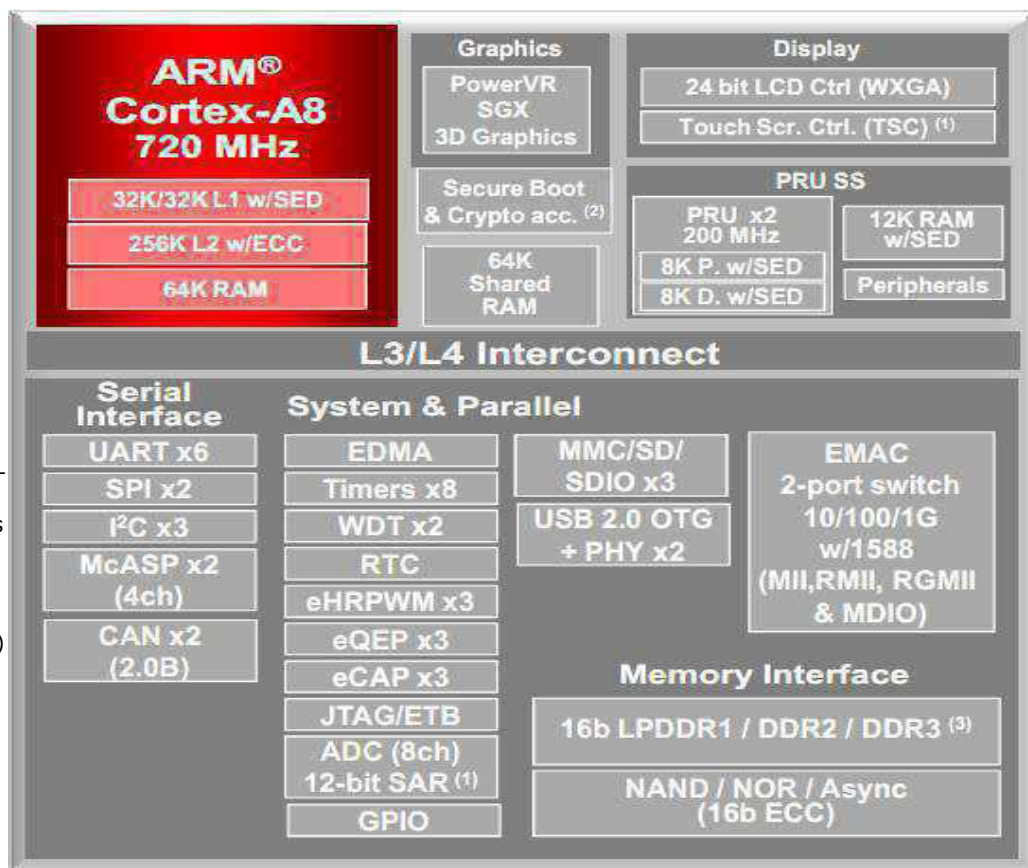
Power Supply

The TX48 accepts an input voltage from various sources:

- 1-cell Li-Ion/Polymer (3.1V to 4.2V)
- 5.0V USB supply or AC wall adapter
- 3.3V

Read more in our TX-Guide:

www.karo-electronics.com/TX-Guide



Ordering Information

Order Number	CPU	SDRAM	Flash	Temp.
TX48/720/256S/128F/I	720MHz AM3354	256MB	128MB	-40°C..85°C

Computer On Module

- Processor Freescale i.MX287, 454 MHz
- RAM 128MB DDR2-400 SDRAM
- ROM 128MB NAND Flash
- RTC DS1339 Real Time Clock
- Power supply Single 3.1V to 5.5V
- Size 26mm SO-DIMM
- Temp.-Range -40°C..85°C

Key Features

- Two 10/100Mbps Ethernet ports with IEEE1588 support
- Two High-Speed USB 2.0 ports
- True colour LCD controller
- Two CAN interfaces
- 4/5 wire Touchscreen interface
- Several peripheral interfaces:
 - UART, SD-CARD, I2C, PWM, Serial Audio, SPI
- Power management optimized for long battery life
- 3.3V I/O

OS Support

- Windows Embedded CE
- Linux

Development System

- Starter-Kit V



**454 MHz
ARM9**

Board highlights:

- Lowest cost 454MHz ARM9
- Industrial temperature range
- Standard TX-DIMM pinout
- as small as possible - only 26mm

The TX28 is a member of a module series, specially designed for Freescales i.MX multimedia processors. TX modules are complete computers, implemented on a board smaller than a credit card, and ready to be designed into your embedded system. TX modules includes a Freescale® i.MX processor, SDRAM and Flash memory. The integrated LCD-controller enables direct connection of an LCD screen. The TX28 is specifically targeted at embedded applications where size, high cpu-performance and cost are critical factors.

Computer on module

- Freescale® i.MX28, 454 MHz
- 128 MByte DDR2-400 SDRAM (16bit)
- 128 MByte NAND Flash memory
- DIMM200-module (67,6mm x 26 mm x 3,6mm)
- Operating temperature range -40..85°C

i.MX28 for Industrial Applications

The i.MX28 family of multimedia applications processors is the latest extension of Freescales ARM9 product portfolio. The i.MX28 family integrates display, power management, and connectivity features unmatched in ARM9-based devices, reducing system cost and complexity for cost sensitive applications. And easy-to-use tools and software help you design differentiated industrial and consumer products in less time.

With optimized performance and power consumption, the i.MX28 is an ideal fit for fanless systems or for portable equipment that need to be battery operated. Numerous connectivity options including dual 10/100 Ethernet (IEEE® 1588 capable) with L2 switch address specific needs for industrial applications. Additionally, the LCD controller with touch screen capability makes it possible to design creative and intuitive user interfaces that are required by many applications.

The i.MX28 family of multimedia applications processors integrates display, power management, CAN, USB, and Ethernet connectivity. The combination of advanced connectivity peripherals with a 454Mhz ARM9 processor core creates a platform for gateway products that bridge multiple networks. With attention to overall system cost, i.MX28 integrates physical USB interfaces (PHY), 10/100 Ethernet, power management, and a resistive touch screen display controller.

Standard TX-DIMM pinout:

- 4-wire UARTs (x3)
- LCD
- I2C / PWM
- Serial Audio Interfaces (x2)
- 4-wire SD-Card/SDIO

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- 480 Mbps USB OTG
- 480 Mbps USB Host

Additional interfaces like CAN, 4/5-wire resistive touch-screen, 2 UARTs and external memory interface are available on TX28 specific pins. Some interfaces are multiplexed with other functions.

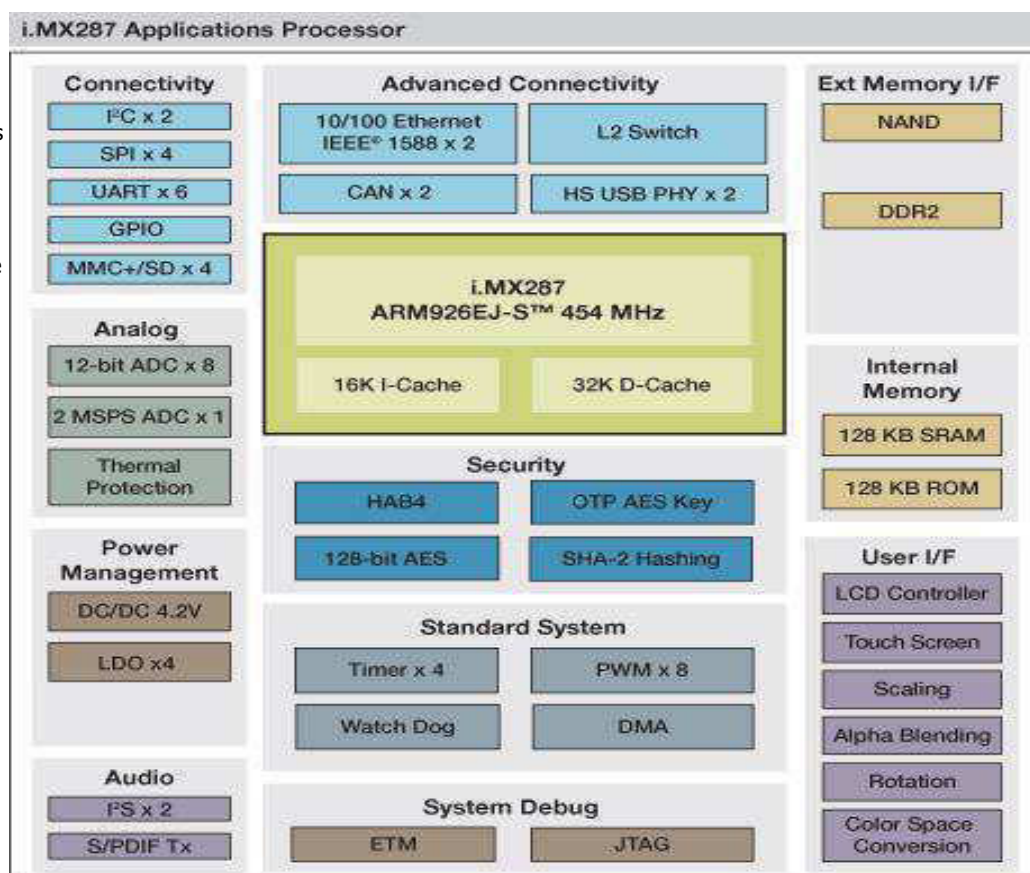
Power Supply

The TX28 accepts an input voltage from various sources:

- 1-cell Li-Ion/Polymer (3.1V to 4.2V)
- 5.0V USB supply or AC wall adapter
- 3.3V

Read more in our TX-Guide:

www.karo-electronics.com/TX-Guide



Ordering Information

Order Number	CPU	SDRAM	Flash	Temp.
TX28/454/128S/128F/I	454MHz i.MX287	128MB	128MB	-40°C..85°C

Computer On Module

- Processor Freescale i.MX283, 454 MHz
- RAM 64MB DDR2 SDRAM
- ROM 128MB NAND Flash
- Power supply Single 5.0V
- Size 26mm SO-DIMM
- Temp.-Range 0°C..70°C

Key Features

- 10/100Mbps Ethernet port
- Two High-Speed USB 2.0 ports
- True colour LCD controller
- 4/5 wire Touchscreen interface
- Several peripheral interfaces:
UART, SD-CARD, I2C, PWM, Serial Audio, SPI
- Power management optimized for long battery life
- i.MX28 battery charger
- 3.3V I/O

OS Support

- Windows Embedded CE
- Linux

Development System

- Starter-Kit V



**454 MHz
ARM9**

Board highlights:

- Lowest cost 454MHz ARM9
- Standard TX-DIMM pinout
- as small as possible - only 26mm

The TX28 is a member of a module series, specially designed for Freescales i.MX multimedia processors. TX modules are complete computers, implemented on a board smaller than a credit card, and ready to be designed into your embedded system. TX modules includes a Freescale® i.MX processor, SDRAM and Flash memory. The integrated LCD-controller enables direct connection of an LCD screen. The TX28 is specifically targeted at embedded applications where size, high cpu-performance and cost are critical factors.

Computer on module

- Freescale® i.MX283, 454 MHz
- 64 MByte DDR2-400 SDRAM (16bit)
- 128 MByte NAND Flash memory
- DIMM200-module (67,6mm x 26 mm x 3,6mm)
- Operating temperature range 0..70°C

The i.MX28 family of multimedia applications processors is the latest extension of Freescales ARM9 product portfolio. The i.MX28 family integrates display, power management, and connectivity features unmatched in ARM9-based devices, reducing system cost and complexity for cost sensitive applications. And easy-to-use tools and software help you design differentiated industrial and consumer products in less time.

With optimized performance and power consumption, the i.MX283 is an ideal fit for fanless systems or for portable equipment that need to be battery operated. The LCD controller with touch screen capability makes it possible to design creative and intuitive user interfaces that are required by many applications.

The i.MX283 multimedia application processor integrates display, power management, USB, and Ethernet connectivity. The combination of advanced connectivity peripherals with a 454Mhz ARM9 processor core creates a platform for gateway products that bridge multiple networks. With attention to overall system cost, i.MX28 integrates physical USB interfaces (PHY), 10/100 Ethernet, power management, and a resistive touch screen display controller.

Standard TX-DIMM pinout:

- One 4-wire UART
- One 2-wire UART
- LCD
- I2C / PWM
- Serial Audio Interface
- 4-wire SD-Card/SDIO

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- 480 Mbps USB OTG
- 480 Mbps USB Host

Additional interfaces like CAN, 4/5-wire resistive touch-screen, 2 UARTs and external memory interface are available on TX28 specific pins. Some interfaces are multiplexed with other functions.

Power Supply

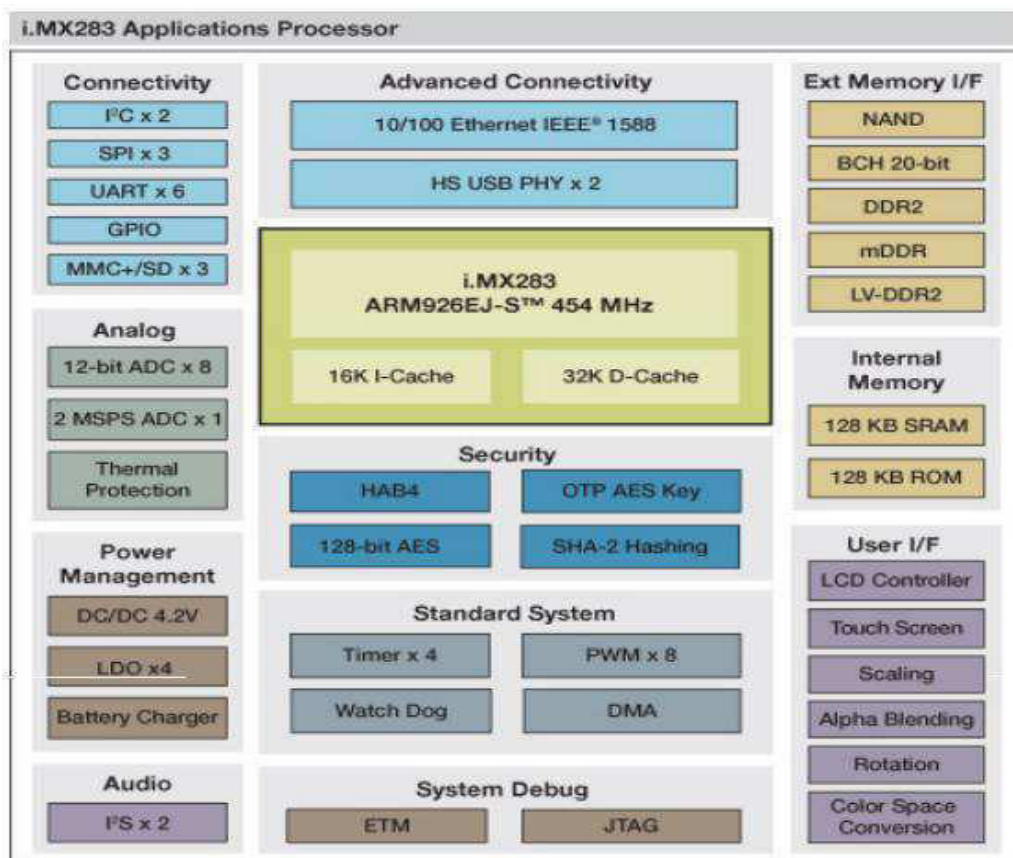
The TX28 accepts a 5V input voltage:

- 5.0V USB supply or AC wall adapter

It's possible to use the battery charger feature of the processor on a custom baseboard.

Read more in our TX-Guide:

www.karo-electronics.com/TX-Guide



Ordering Information

Order Number	CPU	SDRAM	Flash	Temp.
TX28S/454/64S/128F	454MHz i.MX283	64MB	128MB	0°C..70°C

Computer On Module

- Processor i.MX257, 400 MHz
- RAM 64 MB SDRAM
- ROM 128MB NAND Flash
- Power supply Single 3.0V to 5.5V
- Size 26mm SO-DIMM
- Temp.-Range -40°C..85°C

Key Features

- 10/100Mbps Ethernet
- High-Speed USB 2.0 OTG
- Full-Speed USB 2.0 Host
- LCD controller
- Still-picture camera interface
- Several peripheral interfaces:
 - UART, SD-CARD, I2C, PWM, 1-wire,
 - Keypad, Digital Audio (AC97/I2S),
 - Configurable serial peripheral interface,
 - 4/5 wire Touchscreen, CAN

OS Support

- Windows Embedded CE
- Linux 2.6
- RedBoot Bootloader

Development System

- Starter-Kit V



**400 MHz
ARM9**

Board highlights:

- Lowest cost 400MHz ARM9
- Industrial temperature range
- Standard TX-DIMM pinout
- as small as possible - only 26mm

The TX25 is a member of a module series, specially designed for Freescales i.MX25 multimedia processors. TX modules are complete computers, implemented on a board smaller than a credit card, and ready to be designed into your embedded system. TX modules includes a Freescale® i.MX processor, SDRAM and Flash memory. The integrated LCD-controller enables direct connection of an LCD screen. The TX25 is specifically targeted at embedded applications where size, high cpu-performance and cost are critical factors.

Computer on module

- Freescale® i.MX257, 400 MHz
- 64 MByte SDRAM (16bit)
- 128 MByte NAND Flash memory
- DIMM200-module (67,6mm x 26 mm x 3,6mm)
- Operating temperature range -40..85°C

Processor

The i.MX257 processor introduces several key new features such as 3.3V I/O support, three general-purpose 12-bit ADCs, a touch screen controller and integrated 128K SRAM to improve system performance or low-power LCD refresh.

Standard TX-DIMM pinout:

- 4-wire UARTs (x3)
- LCD
- CSI (CMOS Sensor Interface)
- I2C / 1-wire / PWM
- SSI/AC97/I2S (x2)
- 4-wire SD-Card/SDIO
- Keypad 4x4
- CSPI (Configurable serial peripheral interface)

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- 480 Mbps USB OTG
- 12 Mbps USB Host

Additional interfaces like CAN, 4/5-wire resistive touch-screen, 2 UARTs and external memory interface are available on TX25 specific pins. Some interfaces are multiplexed with other functions.

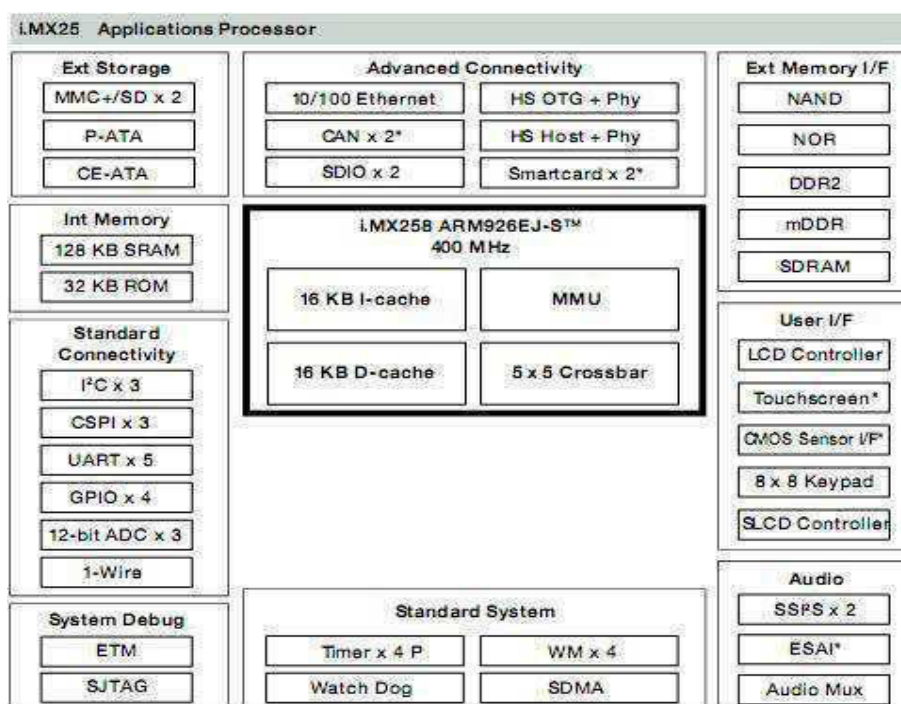
Power Supply

The TX25 accepts an input voltage from various sources:

- 1-cell Li-Ion/Polymer (3.0V to 4.2V)
- 5.0V USB supply or AC wall adapter
- 3.3V

Read more in our TX-Guide:

www.karo-electronics.com/TX-Guide



Ordering Information

Order Number	CPU	SDRAM	Flash	Temp.
TX25/400/64S/128F/I	400MHz i.MX257	64MB	128MB	-40°C..85°C

STARTER-KIT V

The Starter-Kit V is a ready-to-use development system for building applications based on the TX embedded processor boards.

- DIMM200 TX socket
- Two SD-card sockets
- USB 2.0 OTG and USB 2.0 Host connector
- D-SUB 15 VGA connector
- 40pin LCD flat cable header
- 3.5mm headphone connector
- JTAG interface
- SGTL5000 audio codec
- TSC2007 touchscreen controller
- RS232 on 10pin flat cable and SUB-D header
- All pins of the TX socket are connected to daughter board slot for easy application design-in
- 10/100 Mbit/s Ethernet
- 5VDC Power Supply by USB-OTG or power jack.
- 100mm x 160mm
- Schematics of the base board are included for reference.



DISPLAY OPTIONS

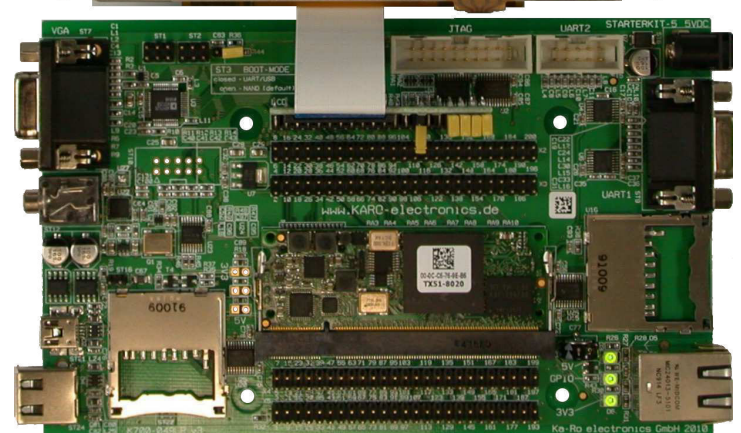
The optional display comes with an FFC cable and a small adapter PCB which can be plugged directly onto the Starter-Kit 40pin LCD header.

TX00-DV01: 5,7" VGA Resistive Touch

- 5,7 inch TFT display
- 640 x 480 dots
- White LED backlight
- Resistive Touchscreen

TX00-DV04: 5,7" VGA PolyTouch™

- 5,7 inch TFT display
- 640 x 480 dots
- White LED backlight
- Capacitive Touchscreen



1 Windows Embedded driver list

Driver	TX25	TX27	TX28	TX48	TX51	TX53	TX6
Windows Embedded CE Version	CE6 R3	CE6 R3	CE6/EC7	EC7	CE6 R3	EC7	EC7
Kernel debugger (Ethernet KITL)	◆	◆	◆/◆	◆	◆	◆	◆
Ethernet	◆	◆	◆/◆	◆	◆	◆	◆
LCD display	◆	◆	◆/◆	◆	◆	◆	◆
Backlight	◆	◆	◆/◆	◆	◆	◆	◆
USB OTG	◆	◆	◆/◆	◆	◆	◆	◆
USB Host	◆	◆	◆/◆	◆	◆	◆	◆
NAND Flash (Persistent Storage)	◆	◆	◆/◆	◆	◆	◆	-
RTC	◆ ¹⁾	◆	◆/◆	◆	◆	◆	◆
SPI	◆	◆	◆/◆	-	◆	◆	-
I2C	◆	◆	◆/◆	◆	◆	◆	◆
General Purpose IO	◆	◆	◆/◆	-	◆	◆	◆
SD Host Controller	◆	◆	◆/◆	◆	◆	◆	◆
UART	◆	◆	◆/◆	◆	◆	◆	◆
General Purpose Timer	◆	◆	-	-	◆	-	-
UCB1400 Audio	◆	◆	N/A	N/A	◆	N/A	N/A
UCB1400 Touchscreen Controller	N/A	◆	N/A	N/A	◆	N/A	N/A
SGTL5000 Audio	◆	◆	◆/◆	-	◆	◆	◆
TSC2007 Touchscreen Controller	◆	◆	◆/◆	-	◆	◆	◆
Keypad	◆	◆	◆/◆	-	◆	◆	◆
Watchdog	◆	◆	◆/◆	-	◆	◆	-
Internal Touchscreen Controller	◆	N/A	◆/◆	◆	N/A	N/A	N/A
Internal ADC	◆	N/A	◆/-	-	N/A	N/A	N/A
CAN	◆	N/A	◆/◆	-	N/A	◆	-
Freescall Multimedia SDK	N/A	◆	◆/-	N/A	◆	◆	◆
PolyTouch™ - Projektive-Capacitive Touch	◆	-	◆/◆	◆	-	◆	◆

¹⁾ Support for I²C RTC DS1339 on custom baseboard, the i.MX25 internal RTC is not supported

Also refer to the links below for a list of catalog items included in particular Windows Embedded CE run-time licenses:

[Windows Embedded CE 6.0 Operating System Components](#)

[Windows Embedded Compact 7 Operating System Components](#)

Register and accept to receive download alerts and you'll get informed as soon as updates are available:

<http://www.karo-electronics.com/registration.html>

2 Linux BSP driver list

Driver	TX25	TX27	TX28	TX48	TX51	TX53	TX6
Linux kernel version	2.6.31	2.6.31	3.11-rc2	3.2	2.6.31/3.0	3.4	3.0.35
Ethernet	◆	◆	◆	◆	◆/◆	◆	◆
NAND Flash	◆	◆	◆	◆	◆/◆	◆	◆
USB Host	◆	◆	◆	◆	◆/◆	◆	◆
USB Device	◆	◆	-	◆	◆/◆	◆	◆
UART	◆	◆	◆	◆	◆/◆	◆	◆
I2C	◆	◆	◆	◆	◆/◆	◆	◆
SPI	◆	◆	◆	◆	◆/◆	◆	◆
PWM	◆	◆	◆	◆	◆/◆	◆	◆
SD Host Controller	◆	◆	◆	◆	◆/◆	◆	◆
LCD	◆	◆	◆	◆	◆/◆	◆	◆
VPU	N/A	◆	N/A	N/A	◆/-	-	◆
Watchdog	◆	◆	◆	◆	◆/◆	◆	◆
RTC	◆ ¹⁾	◆	◆	◆	◆/◆	◆	◆
Keypad interface	◆	◆	◆	◆	◆/-	◆	-
Suspend/Wakeup	-	◆	◆	◆	◆/-	◆	◆
General Purpose IO	◆	◆	◆	◆	◆/◆	◆	◆
UCB1400 Audio	◆	◆	N/A	N/A	N/A	N/A	N/A
UCB1400 Touchscreen Controller	◆	◆	N/A	N/A	N/A	N/A	N/A
SGTL5000 Audio	◆	◆	◆	◆	◆/-	◆	◆
TSC2007 Touchscreen Controller	-	◆	◆	◆	◆/◆	◆	◆
Internal Touchscreen Controller	◆	N/A	◆	◆	N/A	N/A	N/A
CAN	◆	N/A	◆	◆	N/A	◆	◆
PolyTouch™ - Projektive-Capacitive Touch	-	-	◆	◆	-	◆	◆

¹⁾ Support for I²C RTC DS1339 on custom baseboard, the i.MX25 internal RTC is not supported

Register and accept to receive download alerts and you'll get informed as soon as updates are available:

<http://www.karo-electronics.com/registration.html>



System On Module

- Processor 1,2GHz ARM compliant
Marvell 88F6281
- RAM 256MB DDR2-SDRAM
(optional 512MB)
- ROM 128MB NAND Flash
- 7 Port USB Hub SMSC USB2517
- Power supply Single 5V
- Size Qseven 70mm x 70mm
- Temp.-Range 0°C..70°C

Key Features

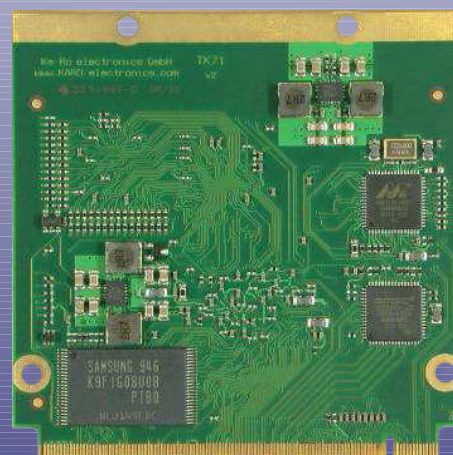
- High-performance ARMv5TE-compliant CPU up to 1.2 Ghz operating speed
- 256KB unified 4-way, set-associative L2 cache
- 16-bit DDR2 memory interface
- Two Gigabit Ethernet MACs, one on-board PHY, 2nd port available on Qseven interface
- Precise Timing Protocol and Audio Video Bridging
- Single PCI-Express port
- USB 2.0 hub with 7 downstream ports
- Two SATA 2.0 ports with integrated PHYs
- Network security engine with various encryption algorithm support
- Audio and MPEG Transport Stream Interface
- Two TDM Channels, SDIO, SPI, TWSI, and Two UART interfaces

OS Support

- Linux 2.6 by kernel concepts
www.kernelconcepts.de

Development System

- Warpcomm

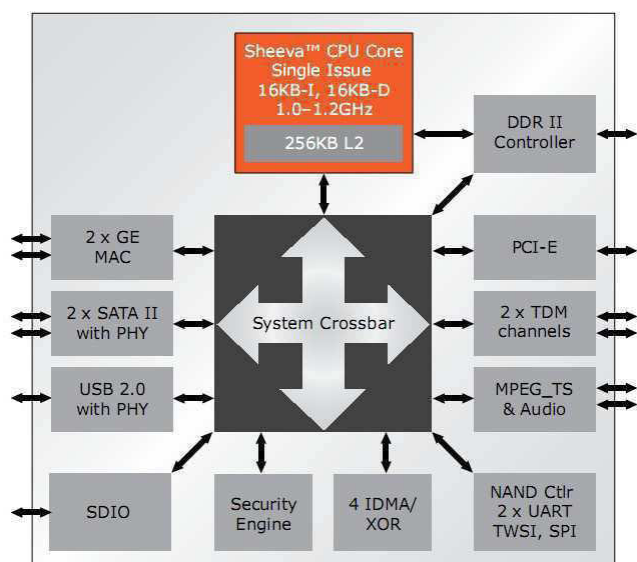


**1.2 GHz
Sheeva
ARM-CPU**

The Marvell® 88F6281 SoC with Sheeva™ embedded CPU technology, is a high-performance integrated controller. It integrates the Marvell Sheeva CPU core which is fully ARMv5TE-compliant with a 256KB L2 Cache. The 88F6281 builds upon Marvell's innovative Feroceon® family of processors, improves performance, and adds new features to reduce bill of materials (BOM) costs. The 88F6281 is suitable for a wide range of applications such as routers, gateway, media server, storage, set-top-box, networking, point of service and printer products. The 88F6281 offers unparalleled integration that makes system design simple and cost efficient. The SoC integrates:

- High-performance single-issue CPU
- 1.0 Ghz - 1.2 Ghz operating speed
- 16KB-Instruction and 16KB-Data 4-way, set-associative L1 cache
- 256KB unified 4-way, set-associative L2 cache
- 16-bit DDR2 memory interface (up to 800 MHz data rate)
- Two Gigabit Ethernet MACs with interface options
- Precise Timing Protocol and Audio Video Bridging
- Single PCI-Express port
- Single USB 2.0 port with integrated PHY
- Two SATA 2.0 ports with integrated PHYs
- Network security engine with various encryption algorithm support
- Audio and MPEG Transport Stream Interface
- Two TDM Channels, SDIO, NAND flash, SPI, TWISI, and Two UART interfaces

The innovative, on-chip crossbar architecture with any-to-any connectivity enables concurrent transactions among multiple units that results in high system throughput allowing system designers to create high-performance scalable systems. Tightly integrated CPU and memory controller significantly improves application performance.



TK71 Baseboard



Dimensions 100 x 122 mm

Power Supply 5V DC

Interfaces 3 X USB 2.0 (Standard connector type A)
 3 x USB 2.0 (Pin header)
 2x Gigabit-Ethernet
 1x SATA
 1x SATA 2.5" HD
 RS232
 JTAG

Slots Mini-PCI-Express
 SD card

The TK71 Baseboard integrates the main interfaces provided by the TK71 module as well as a second Gigabit Ethernet Port. A 2.5" hard-disk (not included) can be mounted onto the top while the TK71 is mounted onto the bottom side.



Ordering Information

Order Number	CPU	SDRAM	Flash	Temp.
TK71/1200/256S/128F	1,2 Ghz	256MB	128MB	0°C..70°C
TK71/1200/512S/128F	1,2 Ghz	512MB	128MB	0°C..70°C

System On Module

- Processor Marvell® PXA270M (312/520MHz)
- RAM 32/64/128MB mobile SDRAM
- ROM 16/32/64MB NOR Flash
- RTC DS1339 Real Time Clock
- Power supply Single 3.3V
- Size 31mm SO-DIMM
- Temp.-Range -25°C..85°C

Key Features

- Buffered 32-Bit External Memory Interface
- Full Speed USB 1.1 Host/Client
- LCD controller up to 640 x 480, 18bpp
- Camera Interface
- Several Interfaces:
3x UART, SDIO, AC97/I2S,I2C,
3x SSP, Keypad, Compact Flash

OS Support

- Windows Embedded CE 6.0
- Linux 2.6
- RedBoot Bootloader

Development System

- Starter-Kit III



**520 MHz
XScale**

Board highlights:

- World's smallest PXA270 system on module
- Lowest power solution, down to 2mW in sleep mode
- 32-bit external memory interface
- NOR Flash
- high efficiency programmable power supply
- Single 3.3V supply
- All PXA270 interface signals are available on a standard DIMM200 socket

The T270M is a complete computer, implemented on a board smaller than a credit card, and ready to be designed into your embedded system. T270M includes a Intel® / Marvell PXA processor, SDRAM and Flash memory. The integrated LCD-controller enables direct connection of a LCD screen, and the standard PCMCIA interface permits simple extension and integration into a target system.

The T270M is specifically targeted at embedded applications where size, high cpu-performance and low power consumption are critical factors.

System on module

- Intel® / Marvell® PXA270 (520MHz)
- 32/64/128 MByte mobile SDRAM (1.8V ultra low power, 32bit)
- 16/32/64 MByte NOR Flash memory
- 32-bit external memory interface
- Single 3.3V power supply
- RedBoot firmware
- SODIMM-module (67,6mm x 31 mm x 4,2mm)
- Operating temperature range -25°C..85°C
- RoHS compliant

PXA270

The Intel® / Marvell PXA270 processor is designed to meet the growing demands of a new generation of leading-edge embedded products. Featuring advanced technologies that offer high performance, flexibility and robust functionality, the Intel / Marvell PXA270 processor is packaged specifically for the embedded market and is ideal for the low-power framework of battery-powered devices. The Intel / Marvell PXA270 processor is the first Intel / Marvell XScale® technology-based processor to include Intel® Wireless MMX™ technology. This enables high-performance multimedia acceleration with an industry proven instruction set. Another innovative feature is the Intel® Quick Capture technology, which provides one of the industry's most flexible and powerful camera interfaces for capturing digital images and video. The new capabilities of Wireless Intel SpeedStep® Power Manager technology provide a quantum leap forward in low-power operation, while maintaining the highest levels of performance.

RedBoot Bootloader

T270M is delivered with pre-installed RedBoot firmware. RedBoot supports several low-level-debugging options and file download via serial XModem. These files can additionally be stored into the permanent flash-memory to be started by command or power-on.

Features

Intel / Marvell XScale® Technology PXA270 core up to 520 MHz

Embedded Packaging

67,6mm x 31 mm x 4,2mm rugged DIMM-Module with fastener

Extended Temperature Range

-25°C to 85°C ambient temperature range available

Reduced Power Consumption

Wireless Intel SpeedStep® Power Manager technology with four low-power modes can change frequency and voltage dynamically. 1,8V ultra low power memories on-board.

Incredible Multimedia

Familiar Intel® Wireless MMX™ technology instructions designed for high-performance multimedia and advanced video.

Advanced Camera Interface

Intel® Quick Capture technology supports cameras for capturing digital images, video and low-power, real-time previews.

Enhanced LCD Controller

Dual-panel LCD with up to 24-bit color. Hardware color space conversion with 256 KB of on-chip SRAM for faster video. Two overlays reduce LCD bandwidth. Integrated Intel Quick Capture technology enables fast video preview.

Fast Access to Wireless Data

Intel® Mobile Scalable Link provides up to 416 Mbps link between communications and applications processors.

Large Peripheral Set

- Quick Capture Interface
- Enhanced LCD controller
- USB 1.1 Host/Client, PWM, 4-bit SD I/O
- USIM card, Keypad controller
- UART x3, AC97/I2C, SSP x3, I2C, JTAG

STARTER-KIT III

The Starter-Kit III is a ready-to-use development system for building applications based on the T270M embedded processor board.

- T270M DIMM200 socket
- Compact Flash type II socket
- SD/MMC-card socket
- USB-Device connector
- USB-Host connector
- D-SUB 15 VGA connector
- 2x 3.5mm audio connectors (stereo line in, headphone)
- JTAG interface
- UCB1400 audio codec & touchscreen controller (obsolete!)
- 3x RS232 on 10pin flat cable headers
- T270M pins connected to flat cable headers
- daughter board slot for easy application design-in
- 10/100 Mbit/s Ethernet (SMSC LAN91C111)
- 3,3V single supply design, 5V also available onboard
- Operating Voltage Range: 8-24VDC
- Transient protected for automotive applications
- 100mm x 160mm, overall height 17mm
- Schematics of the base board are included for reference.

Ordering Information

Order Number	PXA270M	SDRAM	Flash	Temp.
T270M/520/64S/32F/E85/ROHS	520MHz	64MB	32MB	-25°C..85°C

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Ka-Ro electronics:](#)

[TX6U-8010](#)