

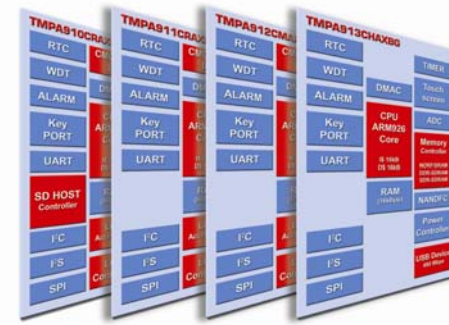
> Reference Board/Starter Kit

- > Compact size (11cm x 15cm)
- > Supported MCU
 - > TMPA910CRAXBG, TMPA910CRBxBG,
 - > TMPA911CRAXBG, TMPA912CMXBG,
 - > TMPA913CHXBG
- > Features
 - > Includes a 3.5" Display with Touch Screen
 - > J-Link Interface
 - > Ethernet Connection
 - > USB 2.0 (480MBps), RS232
 - > Excellent Sound (Audio DAC via I²S)
 - > SD-Card Socket
 - > JTAG Interface
 - > Memory:
 - > 512 MBit SDRAM
 - > 256 MBit NOR Flash
 - > 2 GBit NAND Flash
 - > Extensive Software Support
 - > Segger for emWin, emOS, etc.
 - > Linux from Bplan
 - > Windows CE
 - > Various Software examples available
 - > Plug & Play! Excellent Tool for fast Prototyping
 - > Schematics and Layout Data provided by Toshiba



Plug & Play compatible

Extensive S/W Support: Segger, Linux, IAR Tools



Flexible Design: one Board for all TMPA91x family members

> Simple but Powerful Concept



- > Simple Layout
- > High integration, means only a few additional components required.
- > Easy Display change
 - > Various Displays are already supported. Please ask for Device Driver.
- > Flexible Design
 - > Quick access to all I/Os
 - > Special Version with Bus-Extender available



You can find further information about TOSHIBA's ARM9 product family at:
<http://www.toshiba-components.com/microcontroller>

The Toshiba products listed on this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These Toshiba products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of Toshiba products listed in this document shall be made at the customer's own risk. The products described in this document may include products subject to the foreign exchange and foreign trade laws. The information contained in this document is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties

which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.

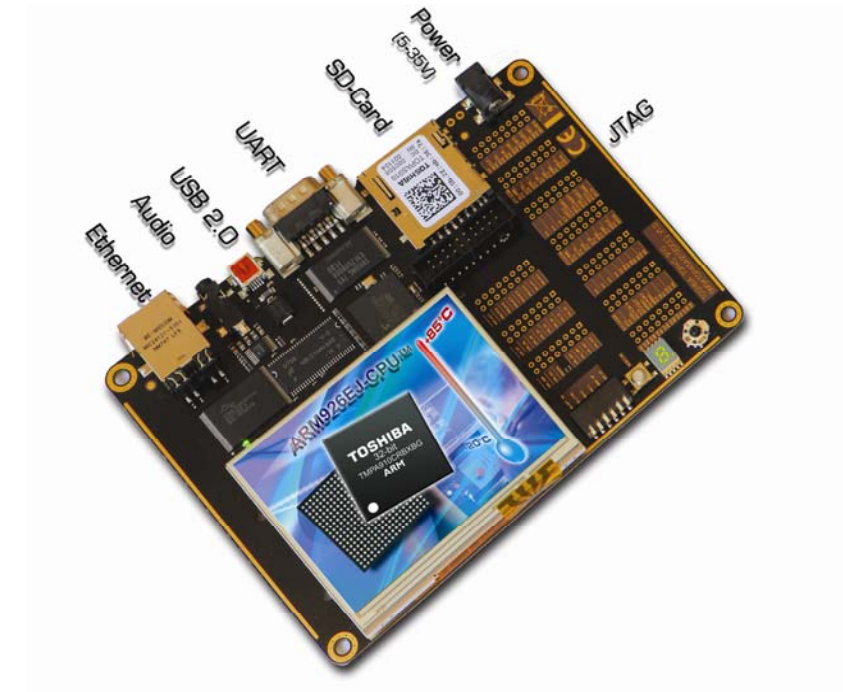
Copyright and published by Toshiba Electronics Europe GmbH; Hansaallee 181- 40549 Düsseldorf
Handelsregister Düsseldorf HRB 22487;
Geschäftsführer: Hiroshi Otsuka; Amtsgericht Düsseldorf

Products or company names mentioned herein are Trademarks of their respective owners. The information contained herein is subject to change without notice.

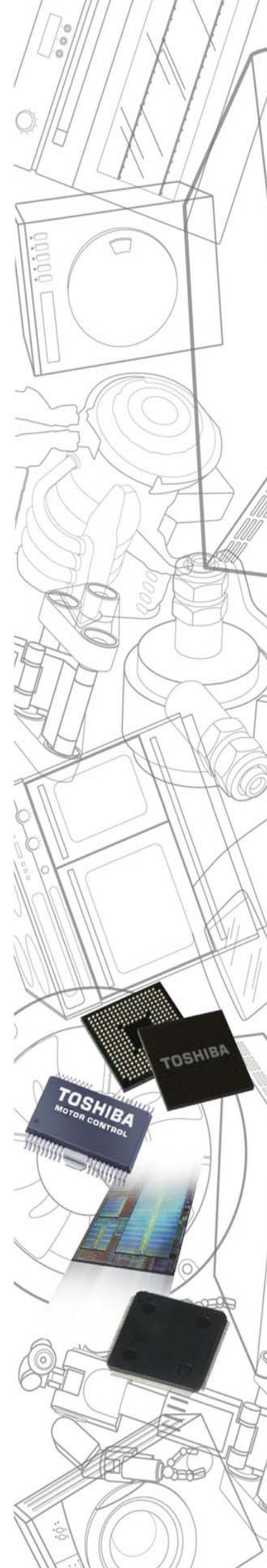
Doc No.:ARM9_group:0902(M)

Visit us: <http://www.toshiba-components.com/microcontroller/>

ARM9 Microcontroller
ARM926EJ-S™ based Graphic Solutions



- > Powerful Graphic Controller and Accelerator
- > Various Operating Systems supported
- > Feature rich set of On-Chip Peripherals
- > Industrial Temperature Range



> Introduction

Microcontroller combines a 32-bit ARM processor with graphics control and processing functionality to simplify multimedia applications

The TMPA9x family brings together a high-performance 32-bit core, with comprehensive graphics control and processing functionality, and a variety of on-board connectivity and peripheral options. These new devices considerably reduce the development time and component count multimedia applications.

The new low power products feature an ARM926EJ-CPU™ core, LCD controller with image process accelerator, touch screen interface, CMOS image sensor input, high speed USB 2.0 (480Mbps), SD Host Controller and comprehensive connectivity options.

The next generation will also incorporate a USB-Host interface, as well as an Oscillation Frequency Detector, to comply with European IEC60730 (Class B) regulations. Samples will be available in summer 2009.

TMPA910CRAXBG

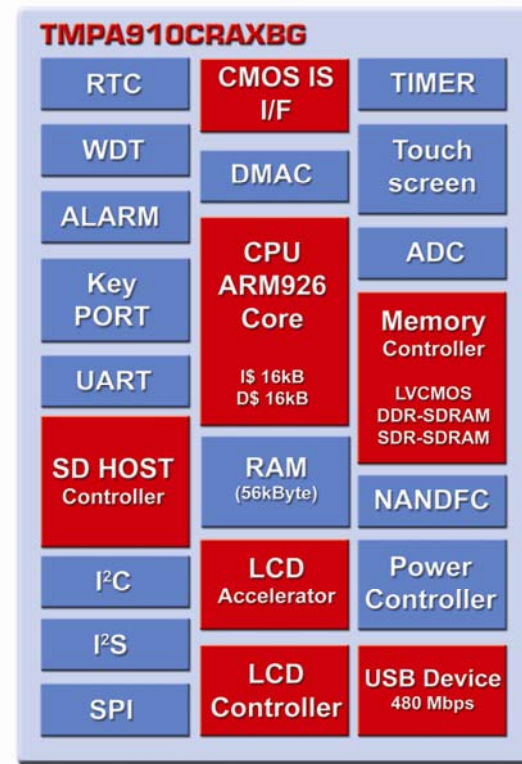
- > CPU Core
 - > ARM926EJ-S I\$16kB/D\$16kB
 - > 7 Layer Multi-Bus System
- > Operating Frequency (all family members are available in 150MHz/200MHz)
 - > 200MHz (0°C to +70°C) (TMPA910CRAXBG)
 - > 150MHz (-20°C to +85°C) (TMPA910CRAXBG)
- > Operating Voltage
 - > Internal Circuit 1.5V +/- 0.1V
 - > External I/O 1.7V to 1.9V
 - > External I/O 3.0V to 3.6V

Features

- > STN/TFT colour LCD controller
 - > WVGA (800x480) with LCD accelerator, max. 1024x768
 - > 64k/16M colors (16-/24-bit color)
- > LCD Data Process Accelerator
 - > Image Scaling up/down (with filtering)
 - > Image blending function (alpha and text blending)
 - > Image rotation
- > DMA Controller
- > CMOS Image Sensor I/F
 - > Up to 1,3Mpixel, YUV-to-RGB conversion
- > Memory Controller
 - > LVCMOS SDR·DDR SDRAM/SDRAM/NORFLASH :1.8V +/-0.1V
 - > ECC circuit supporting both FLC and MLC NAND Flash memories
- > SD Host Controller 50MHz, 32GB
- > USB Device (High Speed 480Mbps)
- > 2 ch. of: SPI / UART / I²C / I²S
- > RTC
- > 16-bit Timer (6x)
- > Touch screen I/F
- > 6 ch. 10bit A/D converter (3.0V to 3.6V), 1,39µsec conversion time

Package

- > BGA361 (16mm x 16mm) 0.8mm pitch ball

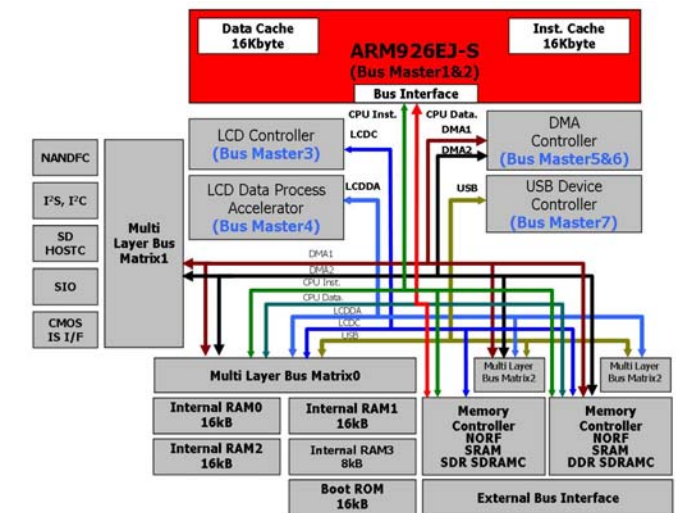


> Multi-Layer Bus system

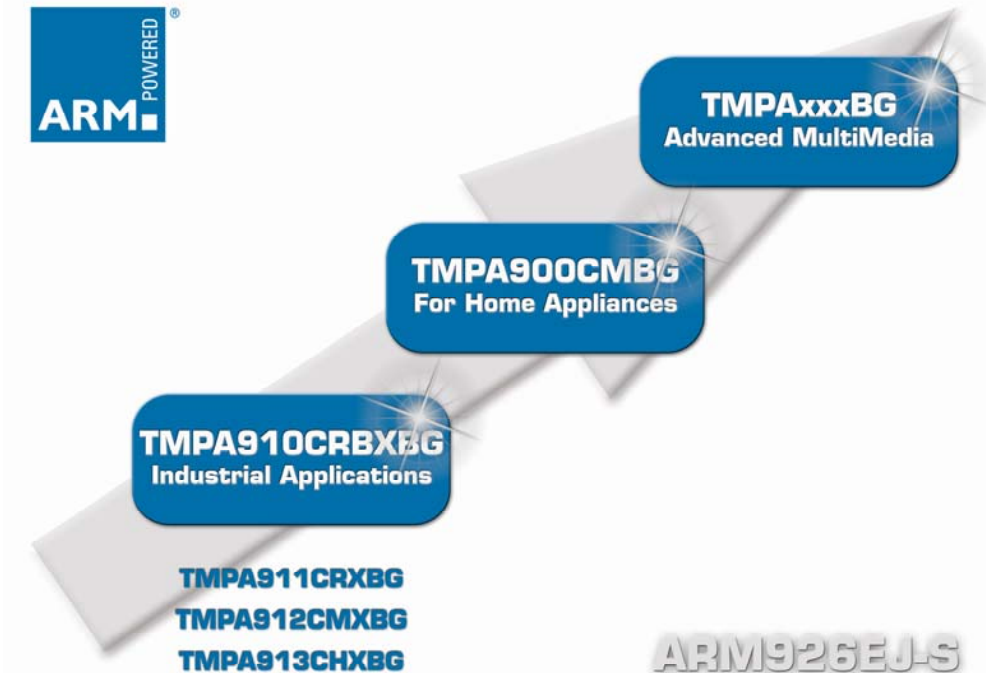
A 7-Layer multi bus system has been implemented in order to increase the overall performance dramatically. MPEG4 or H.264 videos can be shown by additionally using the internal LCD accelerator on a QVGA resolution video screen.

Following bus masters can operate separately:

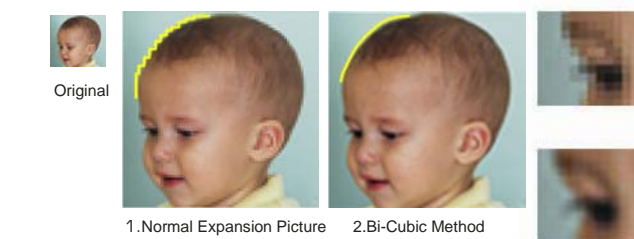
- Bus Master 1: CPU data
- Bus Master 2: CPU instruction
- Bus Master 3: LCD controller
- Bus Master 4: LCD data process accelerator
- Bus Master 5: DMA controller 1
- Bus Master 6: DMA controller 2
- Bus Master 7: USB device controller



> Group Variations



> Main Features of the LCD Accelerator



Expansion Size (pixels)	320*240 (QVGA)	400*272 (WQVGA)	400*240 (WQVGA)	640*480 (VGA)	800*480 (WVGA)
Process time (1 Frame)	2,31ms	3,27ms	4,61ms	9,22ms	11,53ms

Scaling

A Blend+Font mix function
Support picture processing function by H/W
And we prepare the simulator on PC base



Possible to control Brightness At the same time (Font50%)
Possible to Change color at same time

A - Blending

Segment	Product No.	Architecture	ROM (kbytes)	RAM (kbytes)	Packages	SPI Ch.	UART/SIO Ch.	I ² C/SIO Ch.	Memory Ctrl.	ADC 10-bit	16-bit Timer	I/O Ports	Additional features
LCD Controller	TMPA913CRAXBG ²	ARM926EJ-S	ROMless	16k	BGA 361	2	2	2	1	6	6	108	USB 2.0; Touch I/F; WDT; RTC; Ext. Temp.; DAC
	TMPA900CMBG ²	ARM926EJ-S	ROMless	32k	BGA 289	1	2	1	1	8	6	66	USB Device/Host; SD Host; Display Data Accelerator; Touch I/F; WDT; RTC; DAC; OFD ¹
	TMPA910CRAXBG	ARM926EJ-S	ROMless	56k	BGA 361	2	2	2	1	6	6	108	USB 2.0; SD Host; CMOS I/F; Display Data Accelerator; Touch I/F; WDT; RTC; DAC; Ext. Temp.
	TMPA910CRAXBG	ARM926EJ-S	ROMless	56k	BGA 361	2	2	2	1	6	6	108	USB 2.0; SD Host; CMOS I/F; Display Data Accelerator; Touch I/F; WDT; RTC; DAC; Ext. Temp.
	TMPA911CRAXBG ²	ARM926EJ-S	ROMless	56k	BGA 361	2	2	2	1	6	6	108	USB 2.0; CMOS I/F; Display Data Accelerator; Touch I/F; WDT; RTC; DAC; Ext. Temp.
	TMPA912CMAXBG ²	ARM926EJ-S	ROMless	32k	BGA 361	2	2	2	1	6	6	108	USB 2.0; CMOS I/F; Display Data Accelerator; Touch I/F; WDT; RTC; DAC; Ext. Temp.

1) OFD = Oscillation Frequency Detector for IEC60730 class B; 2) Under Development