

TC90400XBG/FG Single-chip Solutions for Digital TV

Highlights

- Highly integrated system-on-chip (SoC) for digital TV that incorporates a high-performance 64-bit RISC processor and three highly optimized DSP processors
- Support for worldwide TV standards (ATSC, DVB & ARIB)
- Complete reference system with software and middleware support for quick product deployment
- Software and middleware based on Linux OS
- Common API support for middleware and application development
- Decode single- or dual-standard definition streams or single high-definition stream
- Decode up to three audio streams
- Two analog outputs and two digital outputs
- One ITU-R656/R601 input for video capture
- Unified memory architecture for optimum system cost
- Built-in MPEG-2 decoder, high-performance scalar and graphics controller for high-quality video output
- Support for HDD connection
- Low-power SoC with power-down modes

Description

The TC90400XBG and the TC90400FG are the first two members of the TC904XX family of products targeted for digital TV applications. The TC90400XBG/FG devices are highly integrated system-on-chip solutions with comprehensive support for worldwide TV standards. Systems based on the TC90400XBG also support hard-disk drive applications.

With capability to decode multiple standard definition streams or single high-definition streams, the TC90400XBG/FG can display content in standard-definition resolution (720 x 480) or half high-definition resolution (up to 960 x 1080). The TC90400XBG/FG can also output standard 480i analog output to support VCRs. This analog output can also be used to feed CRT TV for display of digital transmission.

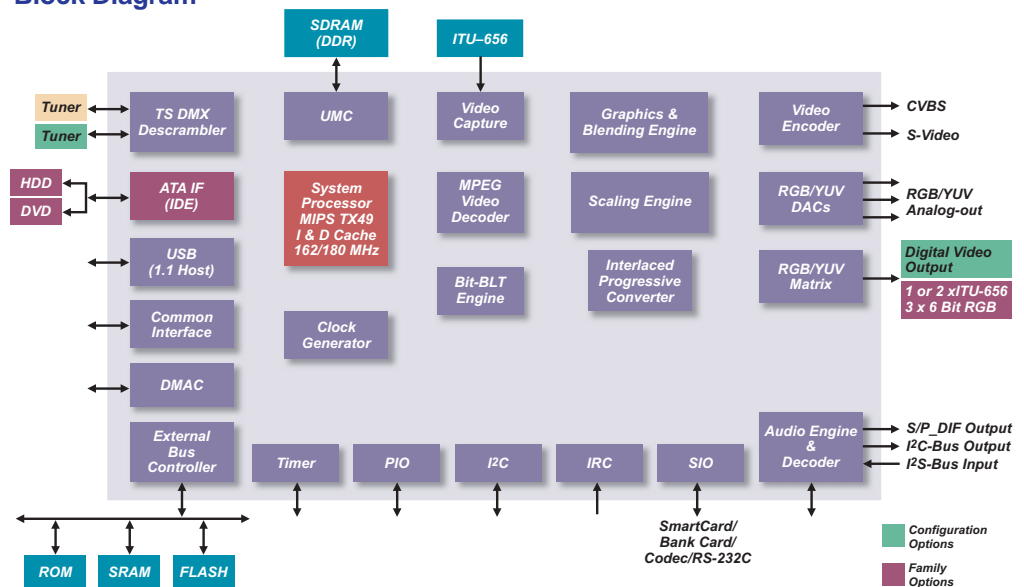
The TC90400XBG/FG devices use multiple DSP engines to perform compute-intensive, multimedia operations to offload

the main CPU for efficient system management of demanding digital TV applications. These devices support a unified 16-bit DDR memory system, as well as a NAND and NOR flash memory controller to reduce overall system cost.

Features

- 180 MHz TX49/L3 64-bit MIPS RISC core
 - 8 KB each I & D cache
 - Unified memory system
 - DDR SDRAM controller (16-bit, 144/162/180 MHz)
 - NAND & NOR Flash support
- Transport Stream Processor
 - Fully compliant to ATSC, ARIB and DVB
 - Supports HDD recording and playback
 - Descrambler (Multi2, DES/TDES, DVB, AES)
- Video Decoder (SD decoding)
 - MPEG-2 decoding (MP@ML and MP@SL) and MPEG-1 decoding
 - Single- or dual-MPEG-2 decoding
- Video Decoder (HD decoding)

Block Diagram



www.Toshiba.com/taec

TC90400XBG/FG Single-chip Solutions for Digital TV

TOSHIBA

Product Brief

TAEC Regional Sales Offices

NORTHWEST

San Jose, CA

TEL: (408) 526-2400

FAX: (408) 526-2410

Portland, OR

TEL: (503) 784-8879

FAX: (503) 466-9729

SOUTHWEST

Irvine, CA

TEL: (949) 623-2900

FAX: (949) 474-1330

Richardson, TX

TEL: (972) 480-0470

FAX: (972) 235-4114

CENTRAL

Buffalo Grove, IL

TEL: (847) 484-2400

FAX: (847) 541-7287

NORTHEAST

Marlboro, MA

TEL: (508) 481-0034

FAX: (508) 481-8828

Parsippany, NJ

TEL: (973) 541-4715

FAX: (973) 541-4716

SOUTHEAST

Duluth, GA

TEL: (770) 931-3363

FAX: (770) 931-7602

www.Toshiba.com/taec

- MPEG-2 decoding for MP@HL for ATSC and BS-Digital
- HD Decoding
 - Display in HD resolution up to 960 x 1080
 - 720p or 1080i compliant
- HD-to-SD down-conversion
 - Display in SD resolution
- Audio Processor
 - MPEG- Audio, Dolby AC-3, AAC decoding
 - Multi-stream decoding (up to 3 streams)
 - Audio post-processing (firmware options)
 - S/P-DIF Transmitter (IEC-60958/61937)
- Graphics Engine
 - Two planes (YUV/Graphics)
 - Alpha blending and video scaling
 - Progressive scan (I/P conversion by line-interpolation)
- Video output
 - Support two different video signals (from independent sources)
 - Video encoder (PAL, SECAM, NTSC)
 - RGB & YUV output (analog & digital)
 - 5 DACs (CVBS/S-Video, RGB/YUV)
 - 3 x 6-bit RGB-output for LCD display
 - 2 x 4:2:2 YUV Digital-Output (ITU R656/R601)
 - VBI re-insertion (Teletext, WSS, closed-caption, video-ID/CGMS-A)
 - Macrovision copy protection (version 7.1L1 and rev1.2 for progressive)
 - Interlaced or progressive output
- Interfaces and Peripherals
 - 8/16-bit ITU R656/R601 input
 - 8/16-bit local bus for NAND/NOR flash and other I/O devices
- Smart card and DVB-CI interface (2 ch each)
- IDE interface, DMA controller (2 ch), SIO (4 ch), PIO (32), timer/counter (three 24-bit), I²C (2 ch), USB 1.1 host (12 Mb/sec), real-time clock, IR-decoding
- Power-down and standby operations
- Package
 - TC90400XBG – 272-pin PBGA
 - TC90400FG – 208-pin QFP

TC90400XBG/FG Development Tools

Reference Board:

Global DTV Reference System

Operating System:

Monta Vista Software, Inc.: Monta Vista Linux

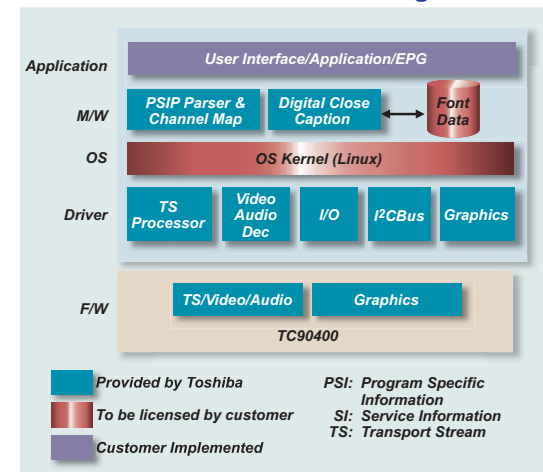
Development Tools:

Compilers, debugger and assemblers

Software Support:

Firmware, Device Drivers, ATSC middleware and Unidirectional Digital Cable Ready (UDCR)

TC90400 Software Structure Diagram



* The information contained herein is subject to change without notice.

* The information contained herein 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.

* TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situation in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc.

* The Toshiba products listed in this document are intended for use 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 foreign exchange and foreign trade laws.

* The products contained herein may also be controlled under the U.S. Export Administration Regulations and/or subject to the approval of the U.S. Department of Commerce or U.S. Department of State prior to export. Any export or re-export, directly or indirectly in contravention of any of the applicable export laws and regulations, is hereby prohibited.

TOSHIBA

TC90400XBG/FG Single-chip Solutions for Digital TV