



## DUAL AVC/MPEG-2/VC-1/MPEG-4 PART 2/DIVX<sup>®</sup> HD DIGITAL VIDEO SYSTEM-ON-A-CHIP SOLUTION FOR SATELLITE, IP, AND CABLE WITH WATCH-AND-RECORD DVR

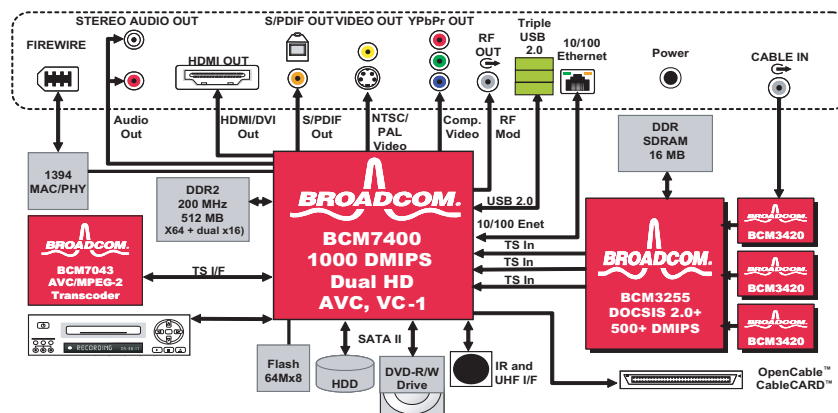
### FEATURES

- **Dual advanced AVC/MPEG-2/VC-1 decoders**
  - H.264/AVC Main and High Profile to Level 4.1
  - VC-1 Advanced Profile @ Level 3
  - VC-1 Simple and Main Profile
  - HD MPEG-2 and SD MPEG-2
  - MPEG still-picture decode
  - DivX<sup>®</sup> and MPEG4 part 2 ASP decode
- **Dual advanced audio processors supporting the following:**
  - AAC LC, AAC LC+SBR level 2, AAC+ level 2
  - Dolby<sup>®</sup> Digital, Dolby Digital Plus
  - MPEG I layers 1, 2, and 3 (MP3)
  - Windows Media<sup>®</sup> audio
  - One pair of on-chip stereo high-fidelity audio DACs
  - 3D SRS audio support
  - Dual I<sup>2</sup>S bidirectional ports
  - S/PDIF output
- **2D and 3D graphics drawing engines**
  - Studio quality text and graphics at HD resolution
  - Supports multiple layers and windows
  - Complete 3D graphics engine with OpenGL<sup>®</sup> ES 1.0 support
- **Digital Noise Reduction (DNR)**
  - Reduces MPEG artifacts including block noise reduction
  - Reduces mosquito noise
- **Motion-adaptive deinterlacer with reverse 3:2/2:2 pull-down**
- **Letterbox detection**
- **Multiple simultaneous, independent DVR channels**
- **OpenCable<sup>™</sup> ready with on-chip MCARD support**
- **1000 DMIPS dual-threaded MIPS32<sup>®</sup>-bit core with FPU and MMU class processor**
- **Digital Image (JPEG, TIFF, etc.) decode acceleration**

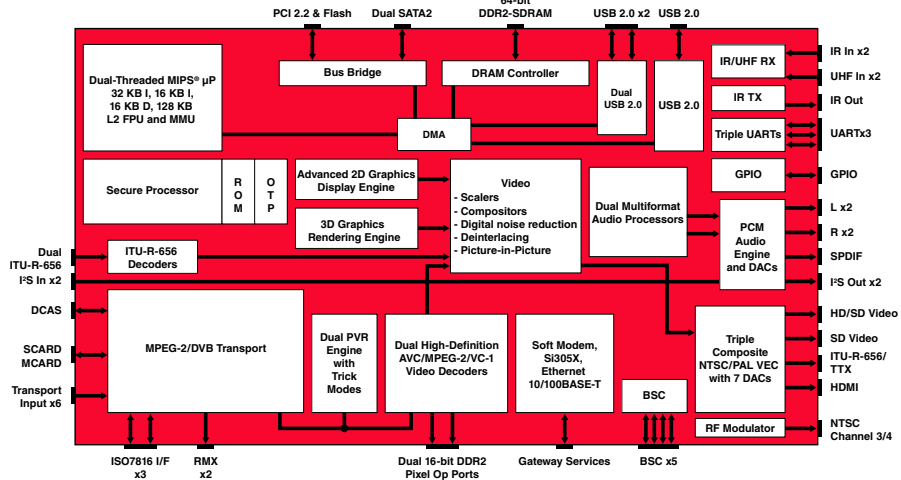
### FEATURES (CONT.)

- **64-bit DDR2 DRAM controller and dual 16-bit pixel-op DDR2 ports**
- **Dual SATA II I/F for DVR applications**
- **HD analog video encoder with simultaneous SD outputs**
  - NTSC-M, NTSC-J, PAL-BDGHIN, PAL-M, PAL-Nc analog outputs
  - 480i/480p/576i/576p/720p/1080i/1080p 24/30 output formats
  - Component RGB or YPrPb output
  - Macrovision<sup>®</sup> 7.1 support
  - SCART 1 and 2
  - Component, S-Video, and composite via seven on-chip V-DACs
  - VBI encoders for CC/TTX with NABTS/CGMSA/WSS/Gemstar<sup>®</sup> standards and dedicated TTX sideband
  - RF modulator with BTSC encoder
  - Dual ITU-R-656 inputs and ITU-R-656 output port
- **HDMI 1.3a/DVI 1.0 MAC and PHY with HDCP 1.3**
- **Broadcom security processor**
- **AES/IDEs/3DES/CSS/CPRM/DTCP copy protection**
- **MPEG-2/DIRECTV<sup>®</sup>/DVB/ARIB data transport demux with IDEs/3DES/DVB/Multi2/AES descramblers**
- **Integrated SiLab Si305x system side device for modem support**
- **3.3V 33-MHz PCI 2.3**
- **Triple USB 2.0 host controller with dual-port transceiver**
- **Ethernet MAC and PHY**
- **Dual UHF remote control receiver**
- **Triple smart card support**

### Dual AVC/VC-1 HD Media Center



# OVERVIEW



**BCM7400 Block Diagram**

The BCM7400 is a dual-channel high definition satellite, cable, and IP set-top box DVR solution offering integrated AVC (H.264/MPEG-4 Part 10), MPEG-2, MPEG-4 Part 2, DivX, and VC-1 video decoding technology. It combines a data transport processor, two high-definition AVC/MPEG-2/VC-1 video decoders, two advanced-audio decoders, 2D and 3D graphics processing, high-quality video scaling and motion adaptive deinterlacing, seven video DACs, dual stereo high-fidelity audio DACs, a dual-threaded 350-MHz MIPS32 with FPU class CPU, and a peripheral control unit providing a variety of set-top box control functions. The BCM7400 supports DDR2 memory architectures.

The MPEG-2 DVB-compliant transport stream/PES parser and demultiplexer is capable of simultaneously processing 256 PIDs via 128 PID channels in up to six independent external transport stream inputs and four internal playback channels. All 128 PID channels can be used by the record, audio, and video interface engine, PCR processing, message filter, and for output via the high-speed transport or remux module. The data transport module can be configured to support eight record channels for PVR functionality and six AV channels to interface to audio and video decoders. The transport provides IDES/3DES/DVB/Multi2/AES descrambling support. A memory-to-memory DMA security module may be programmed for supporting AES/IDES/3DES/CSS/CPRM/CPM/DTCP copy protection algorithms/standards. The BCM7400 features the Broadcom secure processor, providing secure key generation, management, and protection.

The advanced video decoders featured in the BCM7400 are capable of supporting high definition AVC, VC-1, and MPEG-2 streams. AVC support is for Main and High Profile to level 4.1 for 720p and 1080i high definition support or to Level 3.1 for standard definition streams. AVC High Profile was added to the fidelity range extensions specifically to address the needs of consumer broadcast and playback applications. Tools include additional transform sizes and spatial prediction modes and support for adaptive quantization matrix. The video decoders also support high definition VC-1

(Advanced Profile Level 3, Main, and Simple Profiles) and MPEG-2, Main Profile at Main and High Level. The BCM7400 has two advanced audio processors capable of decoding Dolby Digital, Dolby Digital Plus, AAC 5.1, AAC+ level 2, and MPEG 1 layers 1, 2, and 3 with simultaneous pass-through support. 3D SRS audio is also supported. Available audio outputs are I<sup>2</sup>S, S/PDIF, and two pairs of analog outputs.

High-quality video and graphics processing is integrated, featuring advanced studio-quality 2D and 3D graphics processing. Also included are motion-adaptive deinterlacing with 3:2 pull-down, and letterbox detection. Digital noise reduction minimizes mosquito noise and MPEG artifacts, including block noise. Picture-in-picture, split picture, and independent picture in graphics are supported.

The BCM7400 has a dual-stream analog video encoder with Macrovision that supports the following output standards: NTSC-M, NTSC-J, PAL-BDGHIN, PAL-M, and PAL-Nc. The following output formats are supported: composite, S-Video, SCART, RGB, and YPrPb component. The following output resolutions are supported: 480i, 480p, 576i, 576p, 720p, 1080i, and 1080p 24/30. Seven output video DACs are available to be shared among the output functions. The BCM7400 also supports output over an HDMI interface and a channel 3/4 RF modulator. An ITU-R-656 output port is also available with teletext sideband.

The BCM7400 incorporates a complete MIPS32-Verified™ microprocessor subsystem, including caches with bridging to memory and a local bus. Integrated peripherals include three UARTs, three ISO7816 smart card interfaces, counter/timers, a GPIO, a LED/keypad controller, IR receivers, an IR blaster, two UHF remote control receivers, an integrated soft modem system side device, and BSC and SPI controllers. Advanced connectivity features include two USB 2.0/1.1 ports, an additional independent USB 2.0/1.1 port, two SATA II ports, and an Ethernet port with MAC with integrated PHY and alternate media independent interface (MI) with overclocking capability.

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