

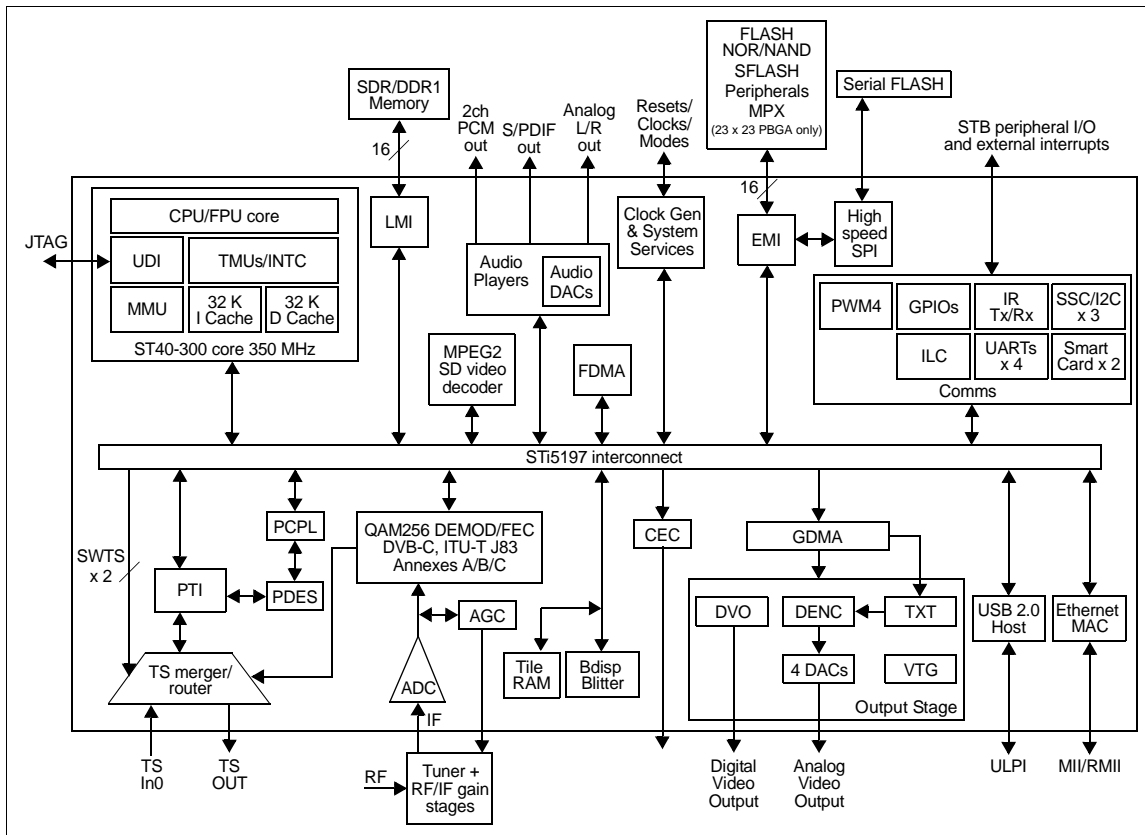


Low-cost QAM demodulator and MPEG2 decoder for set-top box applications

Data Brief

Features

- ITU-T J83 Annexes A/B/C, DVB-C and TSMF compliant
- 256 QAM demodulation and FEC sub-system
- MPEG2 MP@ML video decoding
- Audio decoding (MPEG1, 2, MP3, Dolby Digital 5.1)
- Optional feature: BTSC stereo encoding
- Linux and OS21 compatible ST40 applications CPU (350 MHz)
- 16-bit SDR/DDR1 compatible local memory interface
- Multi-stream, DVR capable, transport stream processing
- Extensive connectivity (USB 2.0 host/ULPI, Ethernet MAC MII/RMII, MPX, DVB-CI)
- Advanced security features, compatible with the latest CA requirements
- Cable STBs can be produced with very small BOM and two-layer PCBs
- Two low power modes
- Integrated voltage regulator
- Two package options: PBGA 23 x 23 and LFBGA 15 x 15



1 Description

1.1 General

The STi5197 uses state of the art process technology to provide an ultra low cost, full featured, SD set-top box SOC. It is a highly integrated solution combining QAM demodulation, audio/video decoding and applications processing into a single chip, suitable for MPEG2 based Cable networks worldwide.

The STi5197 provides a solution for operators to specify a range of low cost SD STBs including low cost Zappers, Interactive STBs and DVR-capable STBs, with content delivery using broadcast or broadband networks, or both (Hybrid STBs).

The STi5197 is optimized for secure Pay-TV applications with integrated DVB, DES, Multi2 and ICAM descramblers and Smart Card interfaces. It also has advanced security features normally found in mid-to-high end devices to further safeguard operator and content investment.

The STi5197 offers enhancements in performance, features and integration to current users of ST's MPEG2 SD family of audio/video decoders and QAM demodulators, whilst reducing cost and time-to-market for the next generation of deployments. Few external components are required to realize a complete STB solution, resulting in very low BOM cost.

1.2 Main features

The STi5197 integrates in a single IC, QAM demodulation, FEC, Multi-stream transport demux, applications CPU, audio/video decode, video processing, graphics and display, advanced security, STB peripherals, audio/video DACs, digital audio/video outputs, USB 2.0 host controller/ULPI and Ethernet MAC MII/RMII.

- QAM demodulator/FEC
 - High-performance 12-bit A/D converter suitable for direct IF architecture in all QAM (quadrature amplitude modulation) modes
 - Demodulation and decoding of ITU-T J.83-Annexes A/B/C and DVB-C bit streams
 - Full digital demodulation
 - Variable symbol rates
 - Supports 16, 32, 64, 128 and 256 point constellations
 - Front derotator for better low symbol rate performance and relaxed tuner constraints
 - Integrated matched filtering
 - Robust integrated adaptive pre and post equalizer
 - On-chip Forward Error Correction (FEC) supporting Annexes A, B and C, with ability to bypass individual blocks
 - Two AGC outputs suitable for delayed AGC applications (sigma-delta outputs)
 - Integrated signal quality monitors, plus lock indicator
 - Processes Japanese transport stream multiplex frame (TSMF)

- High performance CPU for applications, middleware, drivers, audio decoding and network protocols
 - ST40-300, dual-issue, applications CPU
 - FPU, MMU, 32KI, 32KD 2-way set associative caches
 - Supports OS21 and Linux operating systems
 - Target speed > 350 MHz delivering >580DMIPs
- Single, 16-bit wide, unified local memory interface
 - Supports both SDR SDRAM up to 166 MHz and DDR1 SDRAM up to 200 MHz
- MPEG2 MP@ML video decoder, dual SD decoding/PIP capable
- Audio sub-system
 - MPEG-1 layers I/II decoding
 - MP3 decoding
 - Dolby Digital 5.1 decoding and down mix to Stereo/Pro-logic
 - Concurrent decoding of audio description
 - Optional feature: BTSC stereo encoding
 - PCM mixing with sample rate conversion
 - Simultaneous audio decode and output of Dolby streams on S/PDIF IEC60958/IEC61937 digital audio output interface
 - Integrated stereo audio DAC system
- Programmable external memory interface
 - Four separately configurable banks, 8/16-bits wide
 - SRAM, peripheral, NOR Flash, NAND Flash, Burst Mode Flash support
 - Boot from NOR or NAND Flash
 - Support for DVB-CI module host interface
 - Fast synchronous MPX (master) protocol on EMI for interface to STv0498 Triple QAM/DOCSIS cable modem IC
- Interface to, and boot from, Serial FLASH via high speed SPI interface
 - High speed Dual I/O support
- Graphics/Display processing
 - High performance 2-D graphics blitter accelerator and display compositor, Link list control
 - Multi-plane video/graphics composition with alpha blending, typical four-plane use case (background color + still plane + video plane + OSD plane), and integrated Tile RAM bandwidth saver for enhanced performance
 - High quality horizontal and vertical reformatting and resizing, with sample rate conversion/filtering for video and graphics
 - 8 bpp CLUT and 16 bpp true color graphics formats supported
 - Advanced anti-flicker filtering
 - De-interlacing SD to 480p/576p for HDMI output
- Display output
 - PAL/NTSC/SECAM encoder
 - Encoding of CGMS, Teletext, WSS, VPS, Closed caption
 - Macrovision 7.1D copy protection

- Four 10-bit video DACs, outputting RGB/CVBS/YC analog video signals
- High drive-capability on one of the video DACs for CVBS output without buffering
- 8-bit digital video output (DVO), compliant with ITU-R BT 601/656 formats
- 54 MHz output data rate on DVO supporting 480p/576p output over 8 bits
- DVR capable transport sub-system
 - TS reception from internal QAM demodulator
 - External TS interface for a second stream input from external tuner/demodulator
 - Dual internal TS from memory for network/IP stream input and DVR playback
 - TS output for routing to DVB-CI module
 - DVB-compliant, triple-stream transport de-multiplexing
- DVB, DES, Multi2 descrambling
- ICAM2.2 NDS Conditional Access
- DVR supported with HDD attachment via EIDE (PIO mode) or USB 2.0
- Multi-channel flexible DMA Controller
- Connectivity
 - 10/100 Ethernet MAC with MII/RMII interface to external PHY
 - USB 2.0 Host Controller with ULPI interface to external PHY
- On-Chip STB Peripherals
 - Two Smart Card Interfaces with integrated clock generation
 - Four UARTs with Tx and Rx FIFOs
 - Three SSCs for I²C/SPI master/slave interfaces, one of which can be dedicated for tuner control with minimum tuner disturbance
 - Five 8-bit GPIO banks with alternate functions
 - Infrared transmitter/receiver
 - PWM
 - CEC line controller
- System services
 - All clocks generated from a single external crystal
 - Integrated DCO for clock recovery
 - Low power/RTC/watchdog controller
 - JTAG/TAP interface
- Advanced security
 - Secure control words
 - Code authentication
 - JTAG interface locking
 - DVR copy protection
- On chip 1V (nominal) voltage regulator
- Two package options
 - 23 mm x 23 mm. Full Specification, with EMI
 - 15 mm x 15 mm. Full Specification, except no EMI and boot from Serial FLASH only

1.3 Applications

The following diagrams show typical applications of the STi5197. The first two use the 15 mm x 15 mm package version. The other applications use the 23 mm x 23 mm package version.

Figure 1. MPEG2 broadcast cable STB. (Basic Zapper)

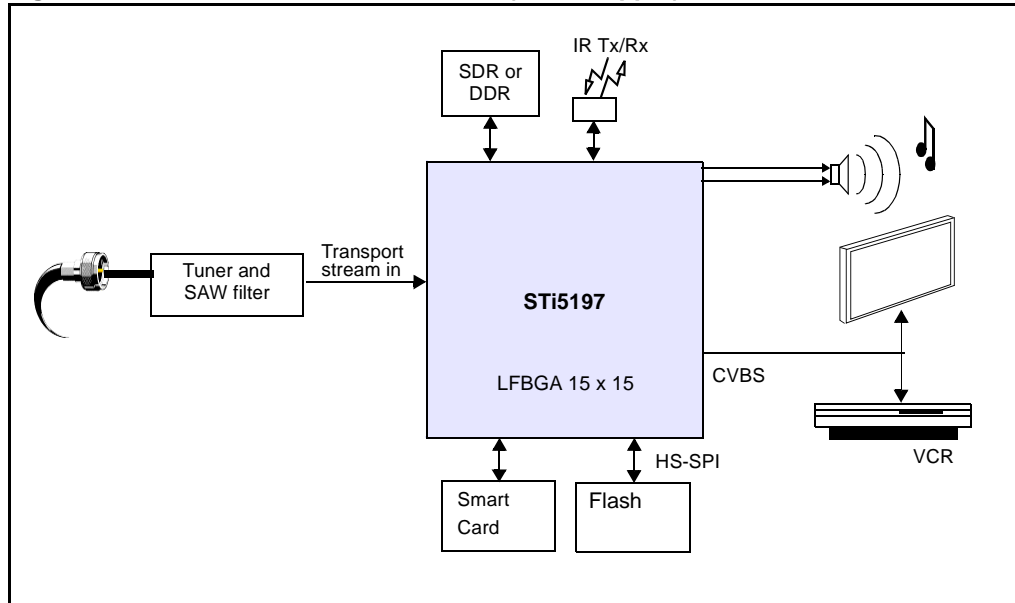


Figure 2. MPEG2 dual tuner, Hybrid/DVR cable STB with HDD

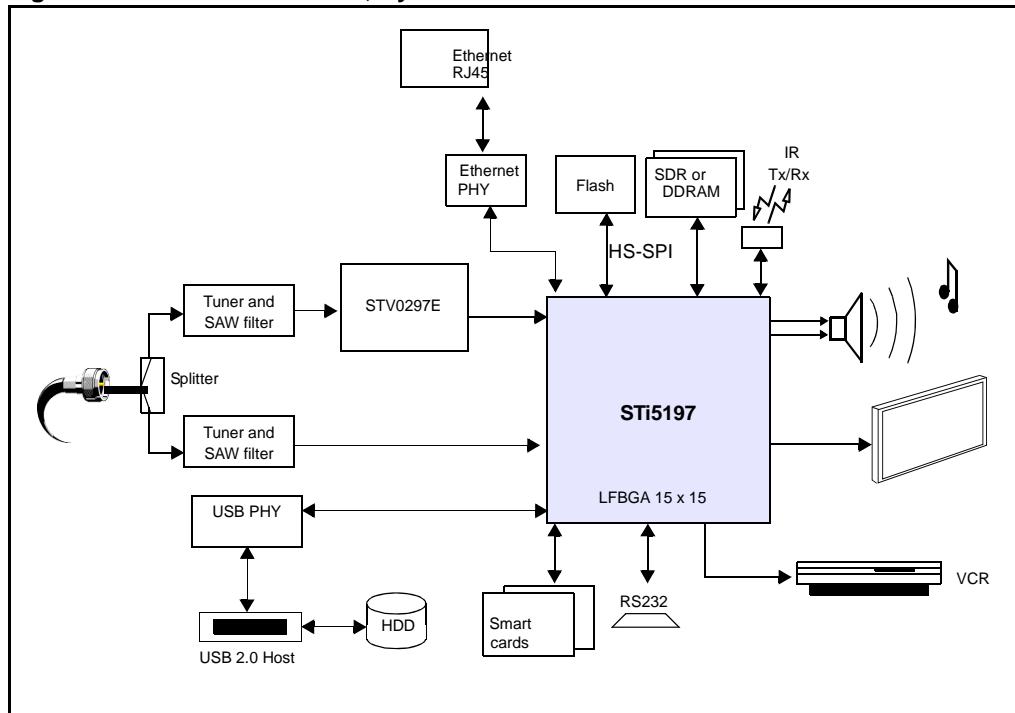


Figure 3. MPEG2 broadcast cable STB with DVB-CI socket

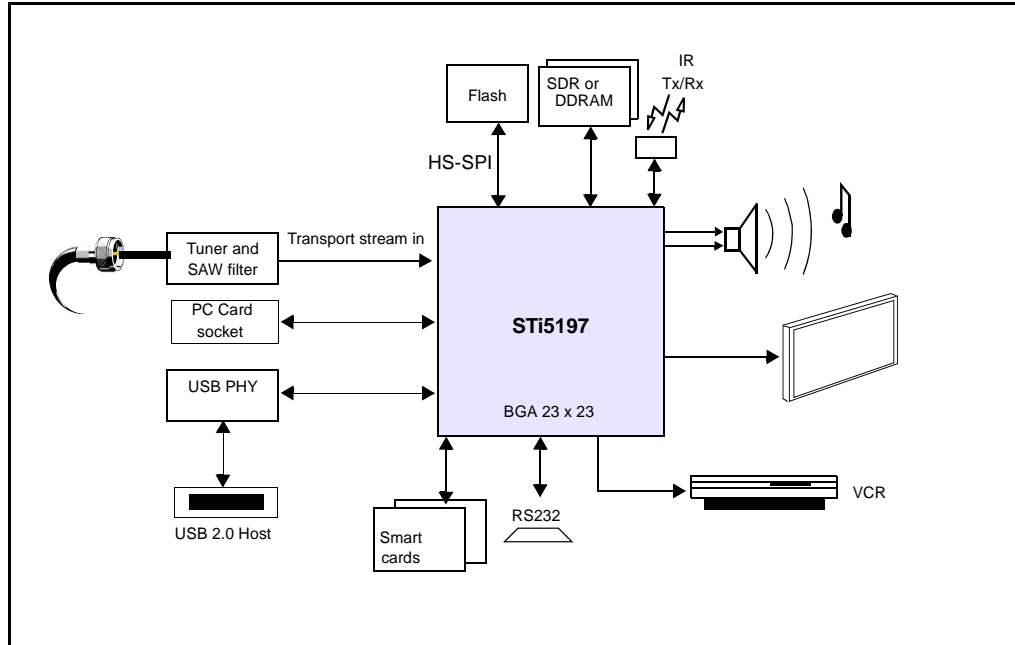
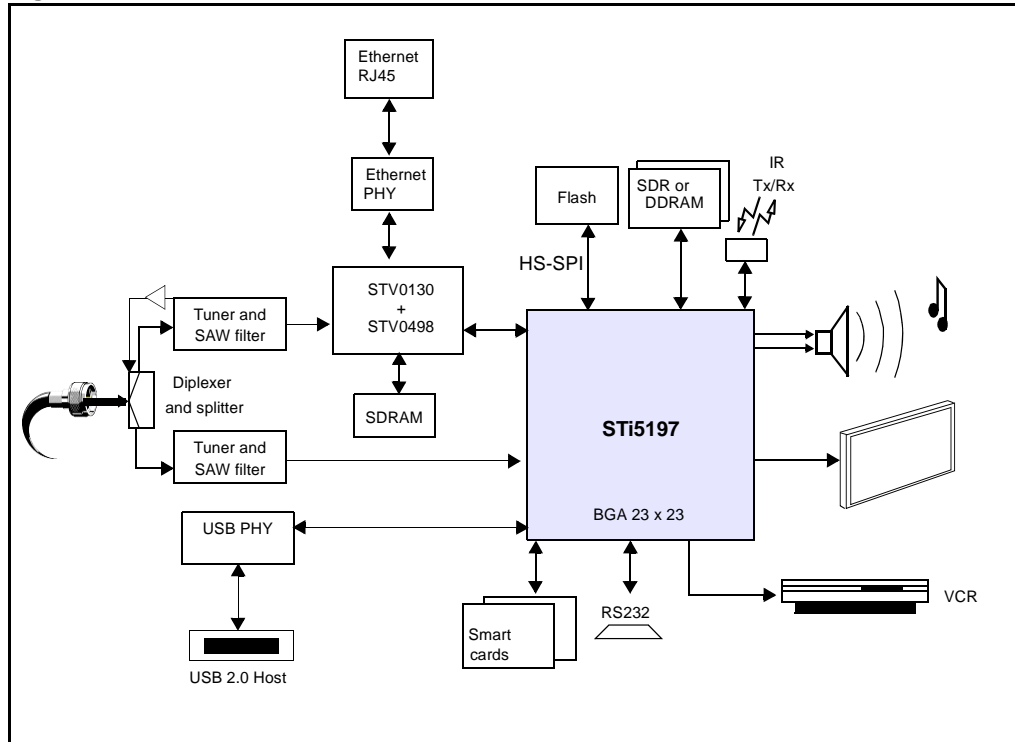


Figure 4. MPEG2 interactive cable STB with embedded DOCSIS cable modem



2 Ordering information

Table 1. Ordering information

Order code	Packaging	Description
STi5197ZDB	LFPGA 15 x 15 mm	Development version, all options.
STi5197ZYB	PBGA 23 x 23 mm	Development version, all options.

3 Revision history

Table 2. Document revision history

Date	Revision	Changes
05-March-2009	1	Initial release

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2009 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

