CONEXANT™

Digital Video Encoder
Bt860/861

**High-Performance Multisource Video
for a Wide Range of Systems**

Conexant's Bt860 and Bt861 are multiport digital video encoders with pixel synchronization and per-pixel blending capabilities. The three 8-bit YCrCb data ports allow for a variety of video and graphics overlay configurations useful in video set-top box applications. The Bt860/861 is designed specifically for video systems requiring the generation of simultaneous composite, S-video (Y/C) and either component YUV or RGB (SCART) video signals.

High-performance video combined with the right set of features make the Bt860/861 a versatile device for almost any video system. 10-bit DACs provide the clear, lifelike video required for modern satellite and cable television set-top boxes, Super VCD and DVD players, PC add-in cards, video conferencing systems and digital cameras. Several power conservation modes extend portable system battery life and help reduce system heating. New televisions and media which make use of wide screen 16:9 aspect ratios are also supported by the Bt860/861 to provide the best flexibility, performance and functionality.
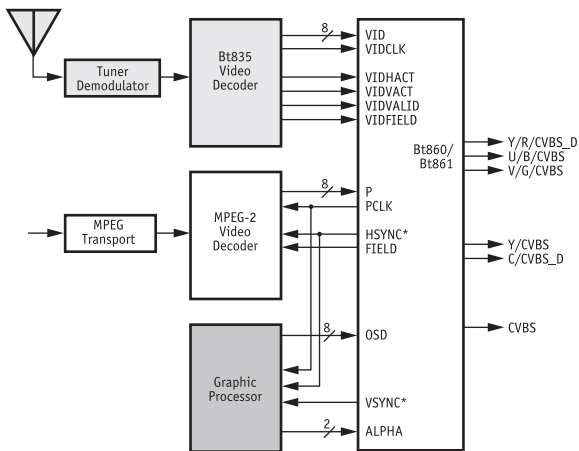

Distinguishing Features

- Six 10-bit DACs with individual power management
- Simultaneous output of RGB, S-video and CVBS, or YUV, S-video and CVBS
- Current drive output DACs for superior video quality and reduced system cost
- Four output sharpness filtering options (0, 1, 2, 3.5 dB gain)
- Programmable adjustment of brightness, contrast, color saturation and hue
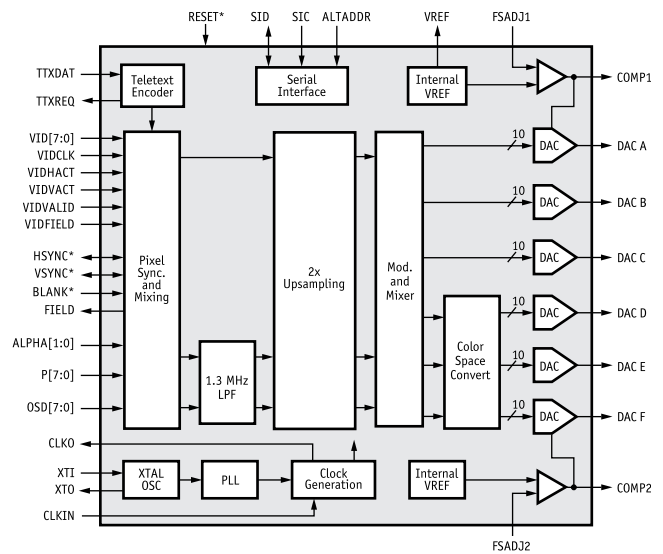
Digital Video Encoder
Bt860/861

Multisource video is a key feature of the Bt860/861. The primary video port (P) is designed to accept both digital video and graphics overlay content from an MPEG video decoder or OSD ICs. This input stream can be either ITU-R BT.601 or 656 in format — as is typically generated by MPEG decoder ICs. The second video port (VID) will accept an alternate digital video stream from a video decoder, such as Conexant's Video Stream family of devices. The third port (OSD) may be used for dedicated graphics overlay devices, such as providing a higher-quality user interface or superior on-screen titles. Alternatively, a second MPEG decoded stream could also be the input to the OSD port for use with multiple MPEG decoder ICs. A pixel synchronization mechanism ensures proper timing between the three ports to deliver the highest-video quality.

The block diagram below illustrates an example of how the Bt860/861 may be used in a TV set-top box, DVD player, or PC card. The white boxes represent

Bt860/861 functional block diagram

Note: CVBS_D represents optional programmable luma delay of up to three pixel clocks

Typical system functional block diagram

the typically used components. The light gray shaded box represents the optional components used for video capture. The medium grey shaded box represents the optional graphic processor IC, which may be added for enhanced OSD or superior user interface.

Worldwide Standards Supported

Worldwide video standards are supported, including NTSC-M (North America, Taiwan, Japan), PAL-B,D,G,H,I (Europe, Asia), PAL-M (Brazil), PAL-N (Uruguay, Paraguay), PAL-Nc (Argentina), PAL-60, and SECAM. The Bt860 and Bt861 are pin and functionally identical, except the Bt861 also contains Macrovision 7.X copy protection circuitry used in DVD players and TV set-top boxes. This permits all types of video systems to use the Bt860/861 and achieve truly high-performance video.

Multiple Video Outputs
for Televisions of All Varieties

The Bt860/861 provides analog luminance (Y) and chrominance (C) information in the Y and C outputs for interfacing with equipment having S-Video inputs. Component video outputs for Y, and the color component signals (U and V) are available for use with the latest DVD players and high-performance televisions. Analog RGB video is also available to permit support of the European SCART/PeriTV interface. Composite analog video is output simultaneously to interface with all types of televisions, and VCRs. One composite analog output has a programmable luma delay to permit the synchronization of both luminance and chrominance when video is transmitted via an RF modulator. A video multiplexer on the output permits tremendous flexibility of output signal configurations. A two-wire teletext (WST-B) interface is also included in the Bt860/861. The table below illustrates the various output configurations of the Bt860/861 DACs.

OUTMODE[2:0]	DAC A	DAC B	DAC C	DAC D	DAC E	DAC F
000	Y	C	CVBS	Y	V	U
001	Y	C	CVBS	R	G	B
010	Y	C	CVBS	CVBS_DLY	CVBS	CVBS
011	Y	C	Y	Y	C	C
100	CVBS	CVBS_DLY	CVBS	Y	V	U
101	CVBS	CVBS_DLY	CVBS	R	G	B
110	CVBS	CVBS_DLY	CVBS	CVBS_DLY	CVBS	CVBS
111	Y	C	CVBS	CVBS_DLY	C	Y

*Note: CVBS_DLY is the composite video signal with the luminance component delayed

I^{2}C Interface

Bt860/861 registers are accessed via a two-wire Inter Integrated Circuit (I^{2}C) interface. Serial clock and data lines, SCL and SDA, are used to transfer data at a rate of 100 Kbps. These lines are used to access and program the internal registers of the device, including the Macrovision registers of the Bt861. Deactivation of I^{2}C communication is possible by asserting sleep or reset modes.

What is a Video Encoder?

A video encoder is an electronic integrated circuit (chip) which delivers the signal to your television from a DVD or video CD player, LaserDisc player, cable or satellite TV set-top box, digital camera, video conferencing system, Internet browser or personal computer (PC). It is the chip which makes everyone's favorite shows look bright, crisp, colorful and clear. With today's new digital video systems, TV pictures can look their best when showing movies and sports from DVD and TV set-top boxes.

Video encoder chips today have the functions of four separate chips integrated into one single chip. These chips take the digital video information which is stored on DVD discs or digital camera memory cards, or transmitted to a satellite dish TV receiver or cable tuner box, and convert it into the "old-fashioned" type of signal a TV requires. The video encoder converts digital bits into analog electrical signals, which instruct the TV what colors should be shown on the screen and how bright or dark they should be. Better quality video encoder chips produce better quality video and make the images seem more lifelike and exciting.

Video encoder technology has improved rapidly in recent years, allowing people to connect a variety of different video devices to their TVs and create the home entertainment systems of their dreams. These relatively inexpensive devices are one of the most critical components of modern video systems, and they have found widespread usage in business, home office, medical, security, professional video studios, and all types of consumer video applications.

Implementation

The Bt860/861 is packaged in an 80-pin Plastic Quad Flat Pack (PQFP) with a 16.95 x 17.45 mm body size. It requires only a minimum of discrete passive support components. It is ideal for low-cost, high-performance video systems and consumer electronics.

Product Features

- Six 10-bit DACs with individual power management
- Simultaneous output of RGB, S-video, and CVBS, or YUV, S-video, and CVBS
- Current drive output DACs for superior video quality and reduced system cost
- Dynamic video load sense circuitry for reduced power operation
- Four output sharpness filtering options (0, 1, 2, 3.5 dB gain)
- Programmable adjustment of brightness, contrast, color saturation, and hue
- Glueless interface with a video decoder output supports locking to a digital video input stream
- Three 8-bit 4:2:2 YCrCb inputs for simultaneous digital video and graphics overlays
- Worldwide NTSC, PAL, PAL-60 and SECAM video standard outputs
- ITU-R BT.656-4, ITU-R BT.601-5 and square pixel digital video input options
- 2X oversampling and internal filtering for reduced cost
- 3.3V single supply voltage with 5V tolerant inputs
- Multiple aspect ratio output support (VARIS II, WSS 4:3, 14:9, 16:9)
- Programmable luma delay (two-channels)
- Master or slave video timing with programmable HSYNC delay
- Interlaced/noninterlaced operation

- Teletext encoding (WST system B)
- Closed Caption and Extended Data Services encoding
- On-board voltage reference for greater accuracy and stability
- Reduced power modes
- 400 KHz serial programming interface
- Internal color bar generation for simplified systems testing
- Macrovision 7.x copy protection circuitry (Bt861 only)
- Housed in a compact 80-pin MQFP package

Applications

- Digital satellite television receivers (DBS/DVB/DSS)
- Digital and analog cable television receivers
- DVD players
- DVD PC add-in cards with TV output
- Internet appliances
- PC video editing cards
- Video game appliances
- Video conferencing systems

Related Products

- Bt835
- Bt852
- Bt856/857
- Bt864A/865A
- Bt866/867
- Bt868/869

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