



## DESCRIPTION

The Visba™ ES3889 video CD companion chip (CC) is the second-generation companion chip that provides an optimal system design for a video CD player when used with the Visba ES3880 video CD PC. The ES3889 Visba video CD CC integrates the CD-ROM controller (featuring direct servo control), as well as most of the required analog discrete components into a simple, cost-effective design for a video CD player. The Visba video CD CC provides the best quality for both video and audio.

The Visba video CD CC features include a high-quality NTSC/PAL digital video encoder (DVE), echo, surround sound, audio DACs, and a phase-locked loop (PLL) clock synthesizer. Additionally, there are three 9-bit video DACs and two 16-bit sigma-delta audio DACs. One video DAC handles composite video output, while the other two handle the S-video outputs. The two 16-bit sigma-delta audio DACs offer differential outputs. The differential dual audio outputs from these audio DACs ensure further noise reduction to a minimum of 90 dB, enabling the Visba video CD CC, to pass the best quality audio on all video CD parameter specifications.

The DVE generates composite and S-video analog signals. Color space conversions (CSCs) are provided to match the input data to the required output format; then, the data is filtered to meet the selected video standards. In addition, the Visba video CD CC is equipped with a remote control interface for power standby on/off, two microphone ports, auxiliary ports, and an interface for accessing internal registers.

Figure 1 shows a block diagram of a typical standalone system, using the Visba ES3880 video CD processor chip and a Visba ES3889 video CD CC.

## FEATURES

- Multistandard TV encoder:
  - CCIR601 nonsquare operation
  - NTSC/PAL formats
  - Master video mode
  - 8-bit interface for YCrCb (4:2:2) input format
  - Simultaneous composite and S-video output
  - Interlaced operation
- Audio DACs:
  - Two 16-bit sigma-delta DACs
  - Dual audio output, SNR better than 90 dB
  - Accepts I<sup>2</sup>S format data
  - Programmable functions
- Surround sound
- Remote control interface for power standby on/off
- Digitally controlled echo with up to 130-ms delay
- Dual microphone input
- Clock synthesizer (PLL):
  - Based on 27-MHz crystal input
  - Generates required clocks for video encoder, audio DAC, echo and surround sound, and video processor
- Device serial communication (DSC) port for command issued/register access
- Graphical user interface (GUI) and hyperlink
- Direct CD servo control
- Vocal assist
- Remote control
- Interrupt control
- Power management
- 100-pin plastic quad flat package (PQFP)
- Single 5V power supply

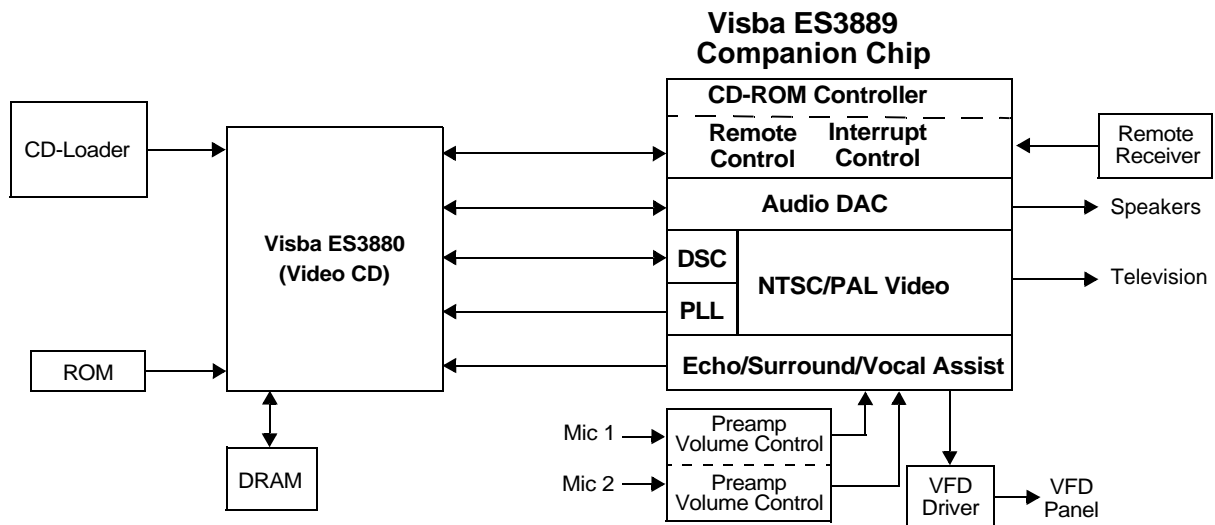


Figure 1 Visba ES3889 Video CD Companion Chip System Block Diagram

## VIDEO CD COMPANION CHIP PINOUT

The pinouts for the ES3889 are shown in Figure 2.

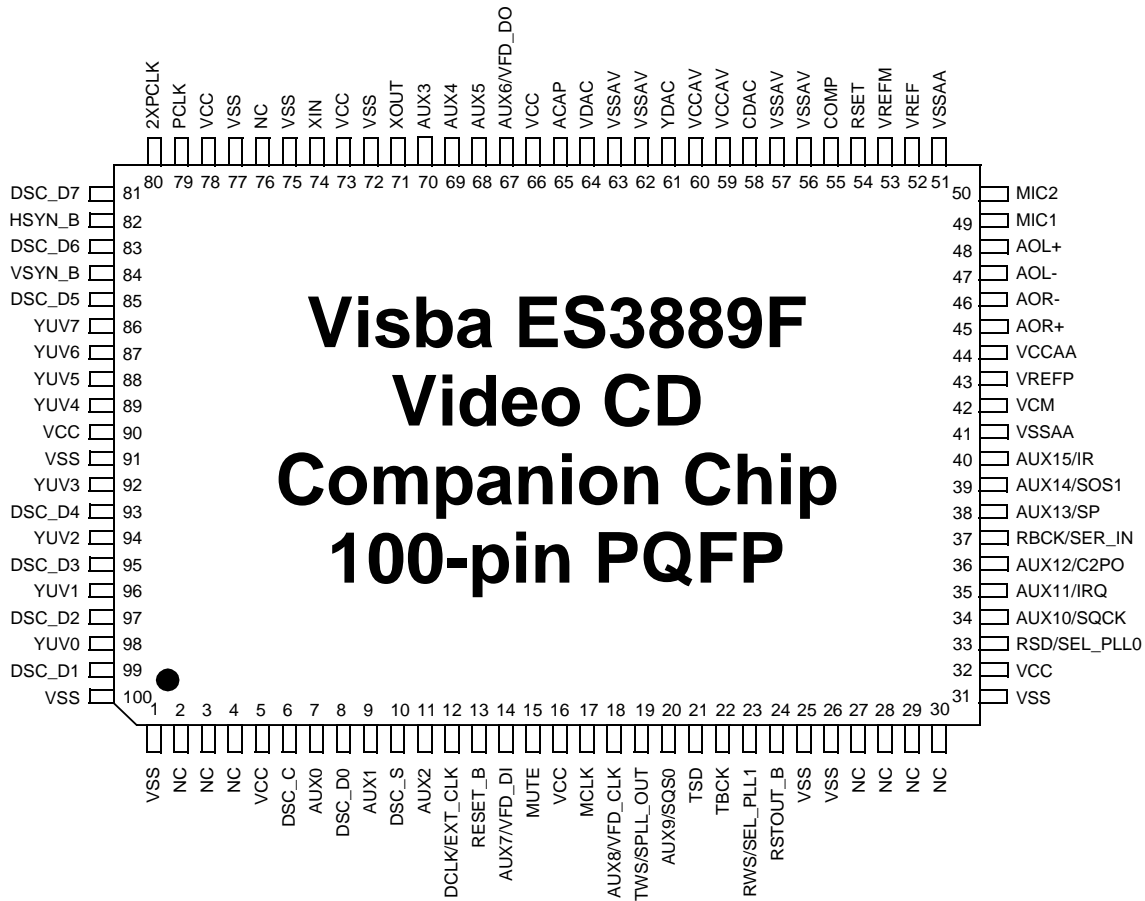


Figure 2 ES3889 Device Pinout Diagram

### PIN DESCRIPTION

The pins for the ES3889 are described in Table 1.

Table 1 ES3889 Pin Descriptions

Names	Pin Numbers	I/O	Definitions
VSS	1, 25, 26, 31, 72, 75, 77, 91, 100	I	Ground.
NC	2:4, 27:30, 76		No connect. Do not connect to these pins.
VCC	5, 16, 32, 66, 73, 78, 90	I	Voltage supply, 5V.
DSC_C	6	I	Clock for programming to access internal registers.
AUX0	7	I/O	Servo forward or control.
DSC_D[7:0]	8, 83, 85, 93, 95, 97, 99,	I/O	Data for programming to access internal registers.

Table 1 ES3889 Pin Descriptions (Continued)

Names	Pin Numbers	I/O	Definitions														
AUX1	9	I/O	Servo reverse or control.														
DSC_S	10	I	Strobe for programming to access internal registers.														
AUX2	11	I/O	Servo LDON or control.														
DCLK	12	O	Dual-purpose pin DCLK is the MPEG decoder clock.														
EXT_CLK		I	EXT_CLK is the external clock. EXT_CLK is an input during bypass PLL mode.														
RESET_B	13	I	Video reset, active-low.														
AUX7	14	I/O	Servo BRKM/sense														
VFD_DI		I	Vacuum fluorescent display data in.														
MUTE	15	O	Audio mute.														
MCLK	17	I	Audio master clock.														
AUX8	18	I/O	Servo mute/open														
VFD_CLK		I	Vacuum fluorescent display clock.														
TWS	19	I	Dual-purpose pin TWS is the transmit audio frame sync.														
SPLL_OUT		O	SPLL_OUT is the select PLL output.														
AUX9	20	I/O	General-purpose input/output.														
SQS0		I	Servo SQS0 or control.														
TSD	21	I	Transmit audio data input.														
TBCK	22	I	Transmit audio bit clock.														
RWS	23	O	Dual-purpose pin RWS is the receive audio frame sync.														
SEL_PLL1		I	SEL_PLL[1:0] select the PLL clock frequency for the DCLK output. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>SEL_PLL1</th> <th>SEL_PLL0</th> <th>DCLK</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Bypass PLL (input mode)</td> </tr> <tr> <td>0</td> <td>1</td> <td>27 MHz (output mode)</td> </tr> <tr> <td>1</td> <td>0</td> <td>32.4 MHz (output mode)</td> </tr> <tr> <td>1</td> <td>1</td> <td>40.5 MHz (output mode)</td> </tr> </tbody> </table>	SEL_PLL1	SEL_PLL0	DCLK	0	0	Bypass PLL (input mode)	0	1	27 MHz (output mode)	1	0	32.4 MHz (output mode)	1	1
SEL_PLL1	SEL_PLL0	DCLK															
0	0	Bypass PLL (input mode)															
0	1	27 MHz (output mode)															
1	0	32.4 MHz (output mode)															
1	1	40.5 MHz (output mode)															
RSTOUT_B	24	O	Reset output, active-low.														
RSD	33	O	Dual-purpose. RSD is the receive audio data input.														
SEL_PLL0		I	SEL_PLL0 along with SEL_PLL1 select the PLL clock frequency for the DCLK output. Refer to pin number 23.														
AUX10	34	I/O	General-purpose input/output.														
SQCK		I	Servo SQCK or control.														
AUX11	35	I/O	General-purpose input/output.														
IRQ		I	ES3880 IRQ or interrupt output or control.														
AUX12	36	I/O	General-purpose input/output.														
C2PO		I	CD C2PO or interrupt input or control.														

**Table 1 ES3889 Pin Descriptions (Continued)**

<b>Names</b>	<b>Pin Numbers</b>	<b>I/O</b>	<b>Definitions</b>
RBCK	37	O	Dual-purpose pin. RBCK is the receive audio bit clock.
SER_IN		I	SER_IN is the serial input DSC mode: 0 = Parallel DSC mode. 1 = Serial DSC mode.
AUX13	38	I/O	General-purpose input/output.
SP		I	Serial interrupt/CD-mute or control.
AUX14	39	I/O	General-purpose input/output.
SOS1		I	Servo SCOR (S0S1) or interrupt input or control.
AUX15	40	I/O	General-purpose input/output.
IR		I	Interrupt input or control.
VSSAA	41, 51	I	Audio analog ground.
VCM	42	I	ADC common mode reference (CMR) buffer output. CMR is approximately 2.25V. Bypass to analog ground with 47- $\mu$ F electrolytic in parallel with 0.1 $\mu$ F.
VREFP	43	I	DAC and ADC maximum reference. Bypass to VCMR with 10 $\mu$ F in parallel with 0.1 $\mu$ F.
VCCAA	44	I	Analog VCC, 5V.
AOR+	45	O	Audio right channel output.
AOR-	46	O	Audio right channel output.
AOL-	47	O	Audio left channel output.
AOL+	48	O	Audio left channel output.
MIC1	49	I	Microphone input 1.
MIC2	50	I	Microphone input 2.
VREF	52	I	Internal resistor divider generates CMR voltage. Bypass to analog ground with 0.1 $\mu$ F.
VREFM	53	I	DAC and ADC minimum reference. Bypass to VCMR with 10 $\mu$ F in parallel with 0.1 $\mu$ F.
RSET	54	I	Full scale DAC current adjustment.
COMP	55	I	Compensation.
VSSAV	56, 57, 62, 63	I	Video analog ground.
CDAC	58	O	Modulated chrominance output.
VCCAV	59, 60	I	Video VCC, 5V.
YDAC	61	O	Y luminance data bus for screen video port.
VDAC	64	O	Composite video output.
ACAP	65	I	Audio CAP.
AUX6	67	I/O	Servo XLAT or Control.
VFD_DO		I	Vacuum fluorescent display data out.
AUX5	68	I/O	Servo data or control.

Table 1 ES3889 Pin Descriptions (Continued)

Names	Pin Numbers	I/O	Definitions
AUX4	69	I/O	Servo CCW/close or control.
AUX3	70	I/O	Servo CW/limit or control.
XOUT	71	O	Crystal output.
XIN	74	I	27-MHz crystal input.
PCLK	79	I/O	13.5-MHz pixel clock.
2XPCLK	80	I/O	27-MHz pixel clock (2 times pixel clock).
HSYN_B	82	O	Horizontal sync, active-low.
VSYN_B	84	O	Vertical sync, active-low.
YUV[7:0]	86:89, 92, 94, 96, 98	I	YUV data bus for screen video port.

## ORDERING INFORMATION

Part Number	Description	Package
ES3889F	Video CD Companion Chip	100-pin PQFP



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