Z90356 and Z90351

64KWord Television Controller with Expanded OSD Features

PB000101-TVC1199

Product Block Diagram

64K Words ROM or OTP		
DSP Core		RAM
ADC		
OSD		
Hardware Cursor		
PWM	I²C	I/O Ports

General Description

The Z90356 and Z90351 are the ROM and OTP versions of a Digital Signal Processor (DSP)-based TV controller that provide a highly-integrated solution for TV design. With 64 KWords of ROM and 1KWord of RAM, the Z90356 provides high processing power.

This DSP architecture supports expanded On-Screen Display (OSD) features including hardware cursor control, independent left and right shadows, and semi-transparency. In addition, the Z90356 has both fixed and programmable color palettes.

Closed captioning and program blocking provide additional versatility for the TV manufacturer. Relocatable CGROM supports unlimited character sets. The Z90356 is an ideal choice for mid-to-high end TV products for both PAL and NTSC standards.

The Z9035x family consists of three basic devices:

- The Z90356 masked ROM
- The Z90351 One-Time-Programmable device
- The Z90359 In-Circuit Emulation (ICE) chip

In addition, ZiLOG provides a complete development suite for TV product development, which includes emulator, evaluation kit, C-Compiler, Application Programmer Interface (API), ZiLOG Developer Studio (ZDS) software, and font editor. These tools help TV developers work efficiently and effectively with quick time to market.

On-Screen Display Features

- 16x16, 16x18, and 16x20 pixel matrices
- 2X and 3X character stretch with smoothing
- Unlimited characters with programmable display attributes
- 8 Fixed palettes plus 8 programmable color palettes
- Hardware cursor control
- Independent left/right shadows with color control, shadows on transparent and non-transparent backgrounds
- Semi-transparency support
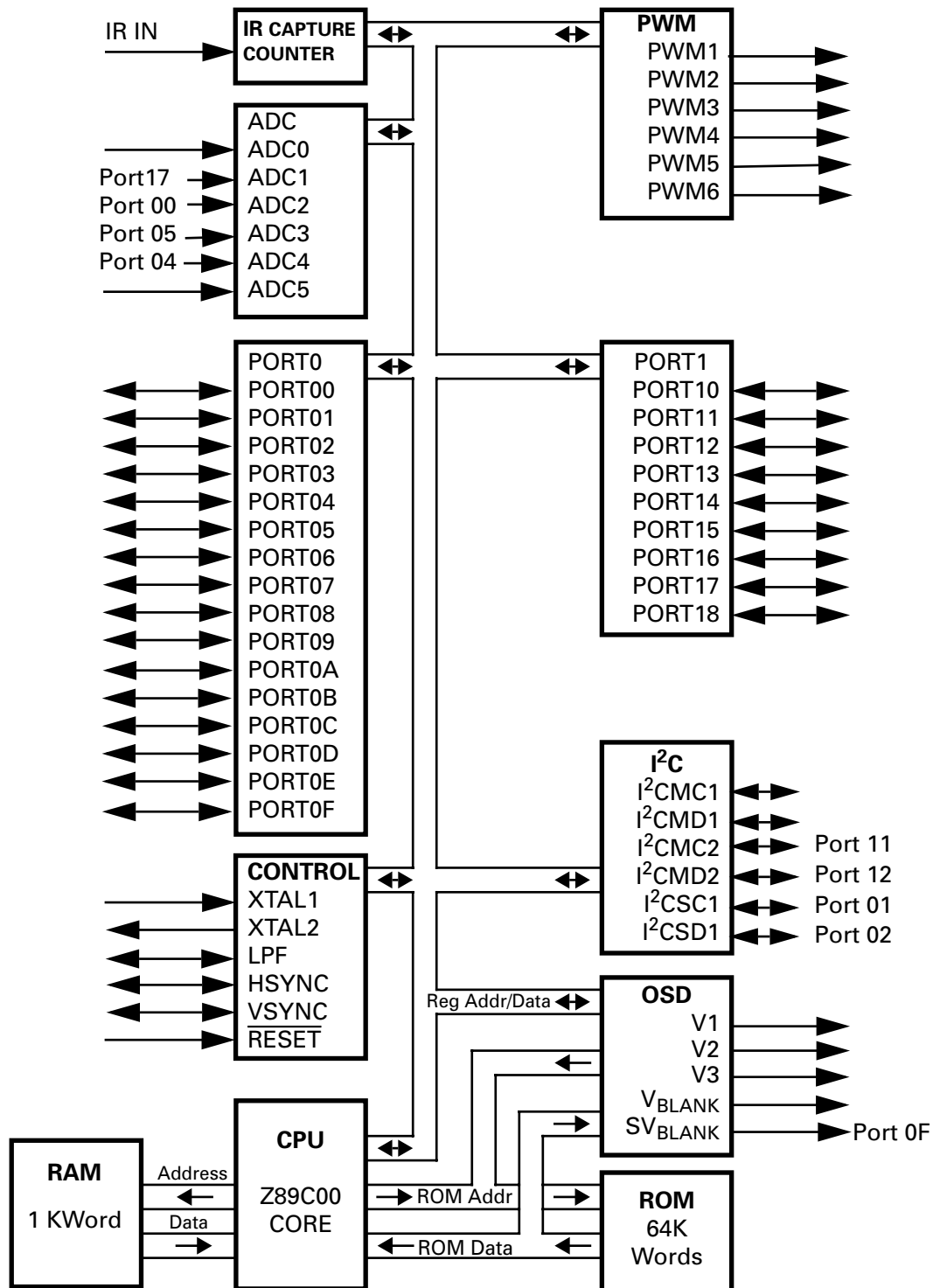
TV Control Features

- Six Channel, 4-bit Analog-to-Digital Converter (ADC) which supports:
  - Automatic frequency tuning (AFT)
  - Analog keypad entry
  - Audio level input adjustment
  - Vertical Blank Interval (VBI) decoding
- Six Pulse Width Modulators (PWM) to control video, audio, and tuners
- Master/Slave I²C bus interface
- Twenty-five programmable I/Os
- On-chip Horizontal Synchronization (H_{SYNC}) and Vertical Synchronization (V_{SYNC}) generation circuits
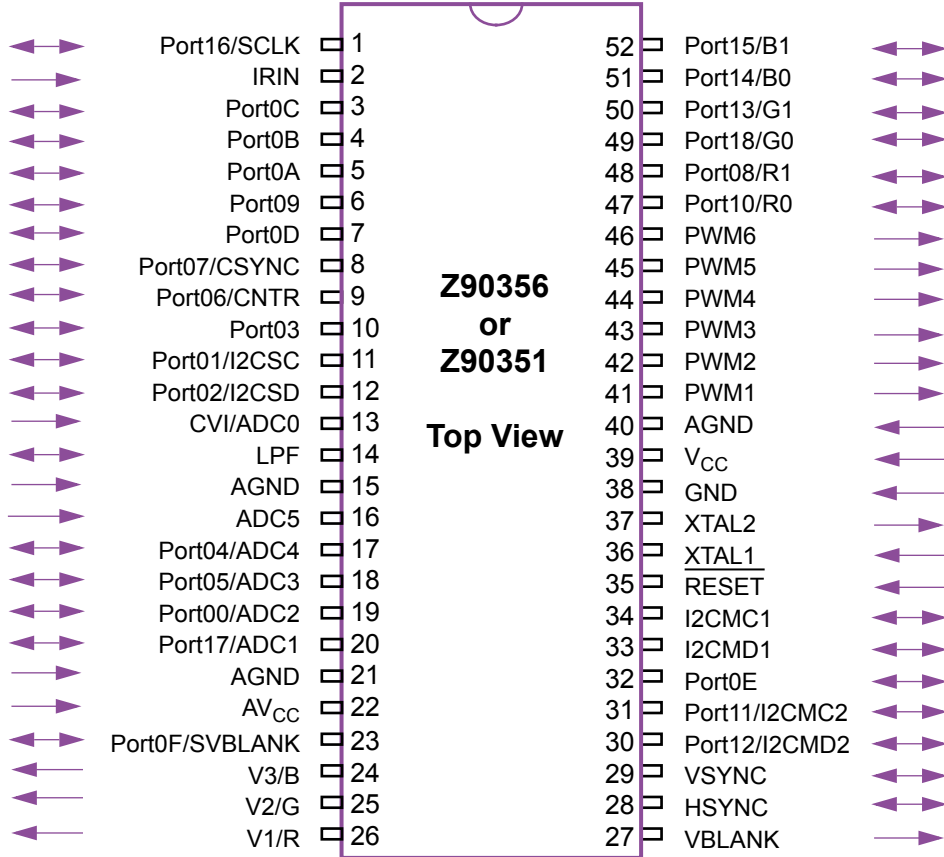- On-chip Infrared (IR) capture register

Controller Features

- 16-bit Single-cycle instruction execution
- Phase Lock Loop (PLL), controlled by a 32KHz external crystal
- 64KWord ROM or OTP with re-locatable Character Generation ROM
- 1KWord of RAM
- 52-pin SDIP package

Block Diagram of Z90356 and Z90351

Pin-Outs and Pin Direction

	Left Pins			Right Pins	
↔	Port16/SCLK	1	52	Port15/B1	↔
→	IRIN	2	51	Port14/B0	↔
↔	Port0C	3	50	Port13/G1	↔
↔	Port0B	4	49	Port18/G0	↔
↔	Port0A	5	48	Port08/R1	↔
↔	Port09	6	47	Port10/R0	↔
↔	Port0D	7	46	PWM6	→
↔	Port07/CSYNC	8	45	PWM5	→
↔	Port06/CNTR	9	44	PWM4	→
↔	Port03	10	43	PWM3	→
↔	Port01/I2CSC	11	42	PWM2	→
↔	Port02/I2CSD	12	41	PWM1	→
→	CVI/ADC0	13	40	AGND	←
↔	LPF	14	39	V_{CC}	←
→	AGND	15	38	GND	←
→	ADC5	16	37	XTAL2	→
↔	Port04/ADC4	17	36	XTAL1	←
↔	Port05/ADC3	18	35	RESET	←
↔	Port00/ADC2	19	34	I2CMC1	↔
↔	Port17/ADC1	20	33	I2CMD1	↔
→	AGND	21	32	Port0E	↔
→	AV_{CC}	22	31	Port11/I2CMC2	↔
↔	Port0F/SVBLANK	23	30	Port12/I2CMD2	↔
←	V3/B	24	29	VSYNC	↔
←	V2/G	25	28	HSYNC	↔
←	V1/R	26	27	VBLANK	→

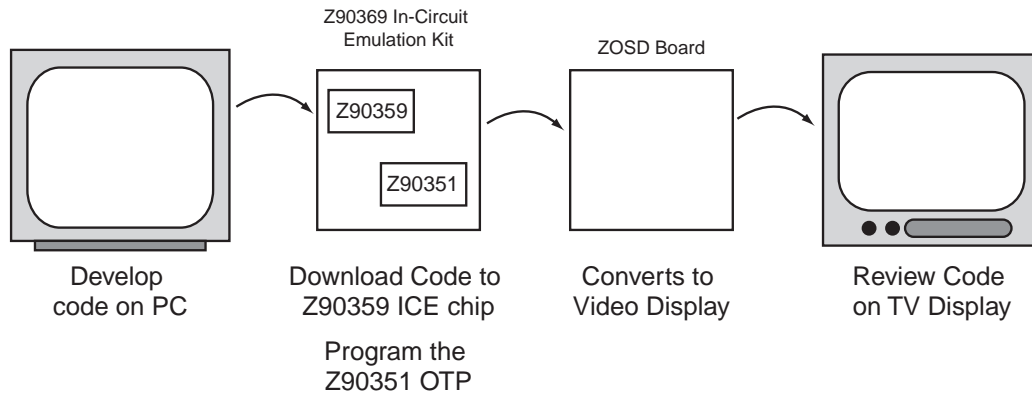**Z90356 or Z90351**

Top View

Development Tools & Support

Available in One-Time Programmable (OTP) and MASK ROM Versions, the Z90356 and Z90351 fulfill Prototype and Production Requirements. The Z90356 uses ICEbox™ (In-Circuit Emulator) tools (Z9036900ZEM) to make Programming and Debugging easy and convenient.

ZiLOG Developer Studio (ZDS) provides automatic code generation and program management.

For code development, ZiLOG offers its proven Application Programmer Interface (API) for OSD. API deals directly with proper sequencing and timing when interfacing with hardware, shielding the user application program from tedious and error prone details.

The Z9034600ZCO, an OSD evaluation board (ZOSD) is used to synchronize the emulator with a video display. Refer to the diagram below for a suggested code development environment. ZiLOG also offers the Z9034600TSC Protopak to verify code on a television.

Z90369 In-Circuit
Emulation Kit

ZOSD Board

Z90359

Z90351

| Develop code on PC | Download Code to Z90359 ICE chip | Converts to Video Display | Review Code on TV Display |

Program the
Z90351 OTP

Related Products

Z9037x	Dual Scan TV controller for Progressive Scan
Z9035x	Advanced TV controller with 64 KWords of ROM, Programmable Palette, and Cursor
Z9036x	Advanced TV controller with 32 KWords of ROM
Z86129	Closed Caption Decoder (CCD)
Z86229	Closed Caption Decoder (CCD) with Second I^{2}C Address Select
Z86131	Auto Time Set
Z86130	Smart V-Chip
Z86230	Smart V-Chip with Second I^{2}C Address Select

Electrical Features Summary

- 40 mA Maximum Supply Current
- 4.50 V to 5.50 V Operating Range

Z9035X Device Selection

Device	Application	ROM (Words)	RAM (Words)	Pkg	I^{2}C	IR Capture	ADC	Bit I/O (max)	PWM (8-bit)
Z90356	TV Receiver Controller	64K	1K	52-Pin SDIP	Yes	Yes	6 Ch	25	6
Z90351	TV Receiver Controller	64K OTP	1K	52-Pin SDIP	Yes	Yes	6 Ch	25	6

Ordering Information

Part	PSI	Description
Z90351	Z9035112PSC	OTP TV Controller
Z90356	Z9035612PSC Rxxxx*	Masked ROM TV Controller
Emulation Kit	Z9036900ZEM	Emulator/ Programmer
Protopak	Z9034900TSC	Protopak for code verification
Evaluation Board	Z9034600ZCO	OSD Evaluation Board
* xxxx is a unique ROM number assigned to each customer code		

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