



Obsolescence Notice

This product is obsolete.

This information is available for your convenience only.

For more information on Zarlink's obsolete products and replacement product lists, please visit http://products.zarlink.com/obsolete_products/

Features

- Single Chip solution for Digital Terrestrial Personal Video Recorder (PVR) Products
- Supports Simultaneous 'Pause & Resume' and 2nd-channel recording
- PVR controller providing bitstream multiplexing, PID filtering and record/playback control.
- Dual on-chip DVB-T COFDM demodulators with Forward Error Correction.
- IDE interface
- MPEG-2 Audio & Video decoder
- PowerPC 405™ CPU Core with 16k/16k cache, Memory manager and Virtual memory system
- Dual SDRAM controller
- 6 Video DACs on-chip, for Composite (CVBS) or Component (RGB, YPrPb) Analog Video
- Twin PAL/NTSC DENCs
- I²S Digital Audio Input
- I²S and S/PDIF Digital Audio outputs
- DVB-CI Common Interface (CI) control and bitstream interfaces
- Conditional Access (CA) DVB-descrambler
- Smart Card Interface
- Inputs for external MPEG-2 Transport Streams, allowing support for external demodulators (e.g. Cable TV, Satellite TV)
- External Modem support interface

Ordering Information

ZL10320/GAC	388 ball EPBGA
ZL10321/GAC	388 ball EPBGA

0°C to +70°C

- Infrared & UART interface
- Linux-based Software Development Kit (SDK)
- Low Power (<1.4W Typical, in full operation)
- Low Application Component Count
- Small Footprint applications
- Supports Macrovision™ Copy Protection - (ZL10321 only; Macrovision license holders only)
- Dolby® Digital Decoding - (ZL10321 only; Dolby® Digital* license holders only - *awaiting certification)
- Ideal solution for UK Freeview services

Applications

- DVB-T based PVR products
- DVB-T/PVR combo products
- Dual Channel decoder products
- iDTV/PVR combo products

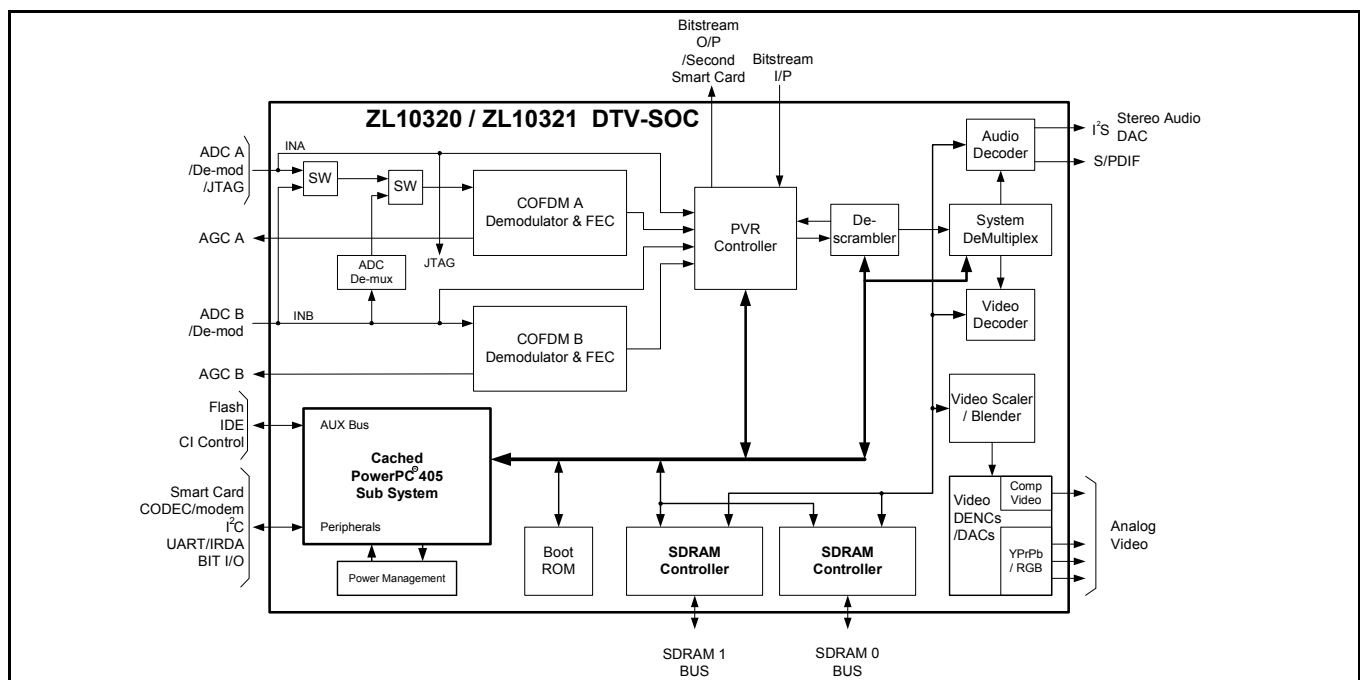


Figure 1 - ZL10320 and ZL10321 Block Diagram

Description

The ZL10320 is a DVB-T PVR-on-a-Chip solution which enables the rapid development of cost effective and feature-rich DVB-T based Personal Video Recorders (PVR). To achieve this, Zarlink has integrated two DVB-T compliant COFDM demodulators, an MPEG-2 audio/video decoder, a PVR controller and a full suite of set-top box/iDTV interfaces together with a high performance CPU into a single System-on-a-Chip (SoC) solution.

The ZL10320's PVR Controller can sustain the simultaneous transfer of three MPEG-2 Transport Streams with a hard disk drive, permitting, for example, simultaneous recording of two TV Channels and playing-back a third; essentially three VCRs in a box. The key capability of PVR technology is the ability to live-pause and time-shift live broadcast television, where a recorded stream can be played back before its recording has completed. The ZL10320 supports this function, and in addition allows the simultaneous recording of a second digital channel. This is made possible by high-performance on-chip DMA controllers, which transfer bitstreams between the PVR Controller, SDRAM and IDE Hard Disk(s) efficiently, with minimum CPU overhead.

PVR functionality places considerable demand on the software environment, which necessitates that such systems are based on robust multitasking operating systems, supporting virtual memory and memory management. Linux, with its wide range of capabilities is ideally suited for such applications. Consequently the ZL10320 uses the high-performance PowerPC 405 RISC processor, which fully supports the requirements of the Linux Operating System.

The ZL10320 is able to share a common Linux Code base at the device driver, middleware and application layers with the entry-level ZL10310/ZL10311 solutions, which are also available from Zarlink Semiconductor.

Also available is the ZL10321 DVB-T PVR-on-a-Chip, which additionally offers Dolby® Digital¹ multi-channel audio decoding, and Macrovision™ Copy Protection for applications requiring Dolby® Audio and Pay TV services.

Device Interfaces

The following peripheral interfaces are available to the user. Apart from possible level translation and connector buffering, no external devices are required to support any of the interfaces.

- Dual 10-bit inputs that may be configured for separate ADC inputs or a single multiplexed ADC input
- Inputs from external video ADCs also act as external MPEG-2 transport stream inputs
- Dual AGC (PWM) outputs for two terrestrial tuners
- Serial control ports for two digital terrestrial tuners
- Serial control ports for external demodulator devices (e.g Satellite Demodulator)
- Common interface control and bitstream interfaces for an external descrambler
- Normal PC (PCMCIA) memory module interface for local software updates
- Shared 64 Mbit SDRAM interface for all decoders and PowerPC 405™
- Dual SDRAM interface to support advanced multi-channel recording functions
- Static memory interface for Flash and external peripherals
- IDE/ATAPI interface supporting up to 2 IDE/ATAPI devices
- External DMA channel and interrupts
- Six analog video outputs give full flexibility on RGB, Y PrPb, and Composite (CVBS) signals (with and without OSD)
- I²S input port from external Digital Stereo source
- Three I²S ports to external audio DACs for main, surround, and centre channels
- Dolby® surround sound control signals
- Sony/Philips Digital InterFace (S/PDIF)
- Full RS232 interface to an external modem or a 4 wire interface to a Codec
- IRDA interface or an additional asynchronous serial interface
- Synchronous serial interface for EEPROM, etc.
- Two Smart card Interfaces (one instead of a Common Interface)

1. The ZL10321 device is awaiting Dolby Certification

- General purpose I²C interface
- General purpose timer for Infrared (IR) decoding
- General purpose individual bit I/Os

If not required in a particular system, any of the peripheral interfaces can be replaced by individual I/O bits from internal general purpose registers. These can then be used for additional purpose, such as interfacing to switches and displays.

Typical Applications

Free-to-Air Terrestrial PVR Receiver

Figure 2 on page 3 shows a typical Free-to-Air DVB-T compatible Terrestrial DTV PVR receiver block diagram employing a ZL10320 device. In its minimal configuration, the ZL10320 requires two 64Mbit SDRAM devices, an audio DAC, a Flash ROM, two Terrestrial Tuner Blocks (Zarlink can provide reference designs for modular tuners and 'tuner-on-motherboard' solutions), a dual multiplexed 10-bit analog to digital converter and an IDE Hard Disk Drive.

The compelling capability of PVR technology is the ability to live-pause and time-shift live broadcast television, where a recorded stream can be played back before its recording has completed. The ZL10320 extends this capability by additionally offering the ability to simultaneously 'Pause-Resume' on one TV channel whilst recording a second TV channel.

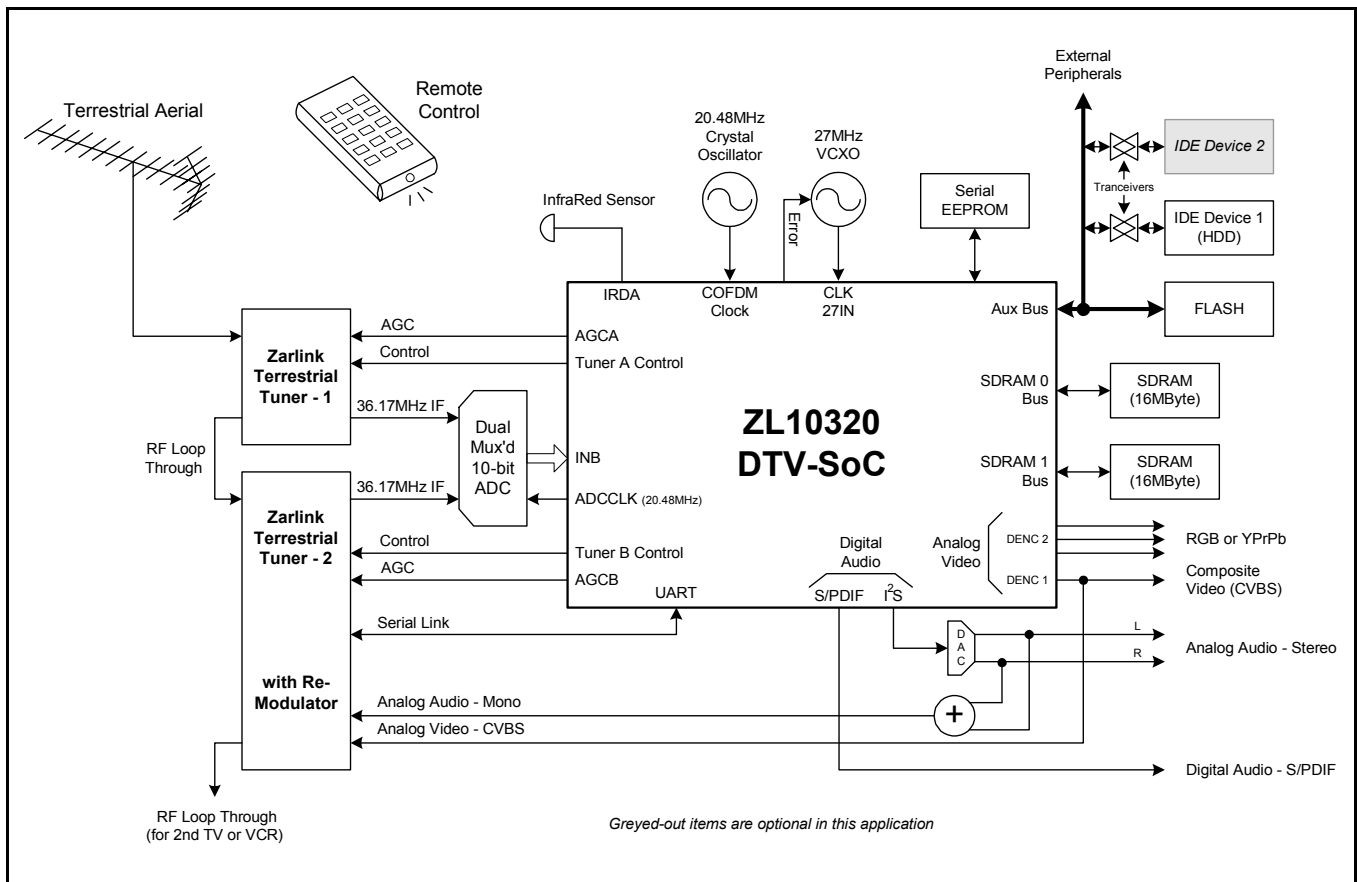


Figure 2 - Block diagram of a typical ZL10320 based Free-to-Air DVB-T PVR receiver

The Terrestrial Tuner sections perform an independent down conversion of the received DVB-T signal from the Antenna, to an IF frequency in the range of 30MHz to 57MHz, dependent on television system (typically 36.17MHz Center Frequency, with ± 4 MHz span). The analogue IF is then converted to the digital domain, with a 10-bit ADC, clocked at 20.48MHz and the resulting Digital output is centered on 15.69MHz. This Digital signal is applied to the ZL10320 via the ADC_IN[9:0] input pins, in the form of a 10-bit parallel signal.

The ZL10320 converts the digitized IF from a Terrestrial TV Tuner into an MPEG-2 Transport Stream, which can be optionally de-scrambled (if CA scrambling is used by the broadcaster), and de-multiplexed into separate Packetised Elementary Streams (PES), which are routed to the MPEG Audio and Video decoders, and SI data to the PowerPC 405TM subsystem. The PVR controller block contains an additional 64 level PID filter for the efficient selection of the desired programme for recording.

Decoded Video can then be mixed and optionally scaled with On-Screen Display (OSD) Graphics generated by the DTV application software. The resultant combination of video and graphics are then routed to the PAL/NTSC Digital ENcoders (DENCs) for display on the TV via the on-chip 10-bit video DACs. The Video DACs can then produce Analog Video in either Composite Video (CVBS), or Component Video (RGB or YPrPb).

Decoded Audio is output directly from the audio decoder sub-system to the I²S (Inter IC Sound) and S/PDIF (Sony/Philips Digital InterFace) outputs.

The Decoded Audio and Video from the ZL10320 can either be provided via standard Analogue Video and Audio connections to a Television Monitor, or can be used to provide the inputs to a UHF re modulator to provide a UHF Analogue Television signal to connect to a standard analogue TV.

Free-to-Air Dual-Standard Terrestrial and Satellite PVR Receiver

The ZL10320 can be used to implement multi-standard DVB receiver with the addition of external demodulator devices. Figure 3 on page 5 shows the block diagram of an example application of a dual-standard dual-channel selectable Satellite and Terrestrial PVR receiver. Zarlink Semiconductor's Satellite Tuner technology allows for the DVB-S and DSS Satellite television standards to be received. With the advent of Free-to-view satellite services in some countries, this concept has potential applications in regions where some TV services are available only on one or other standard (Terrestrial or Satellite) but not both.

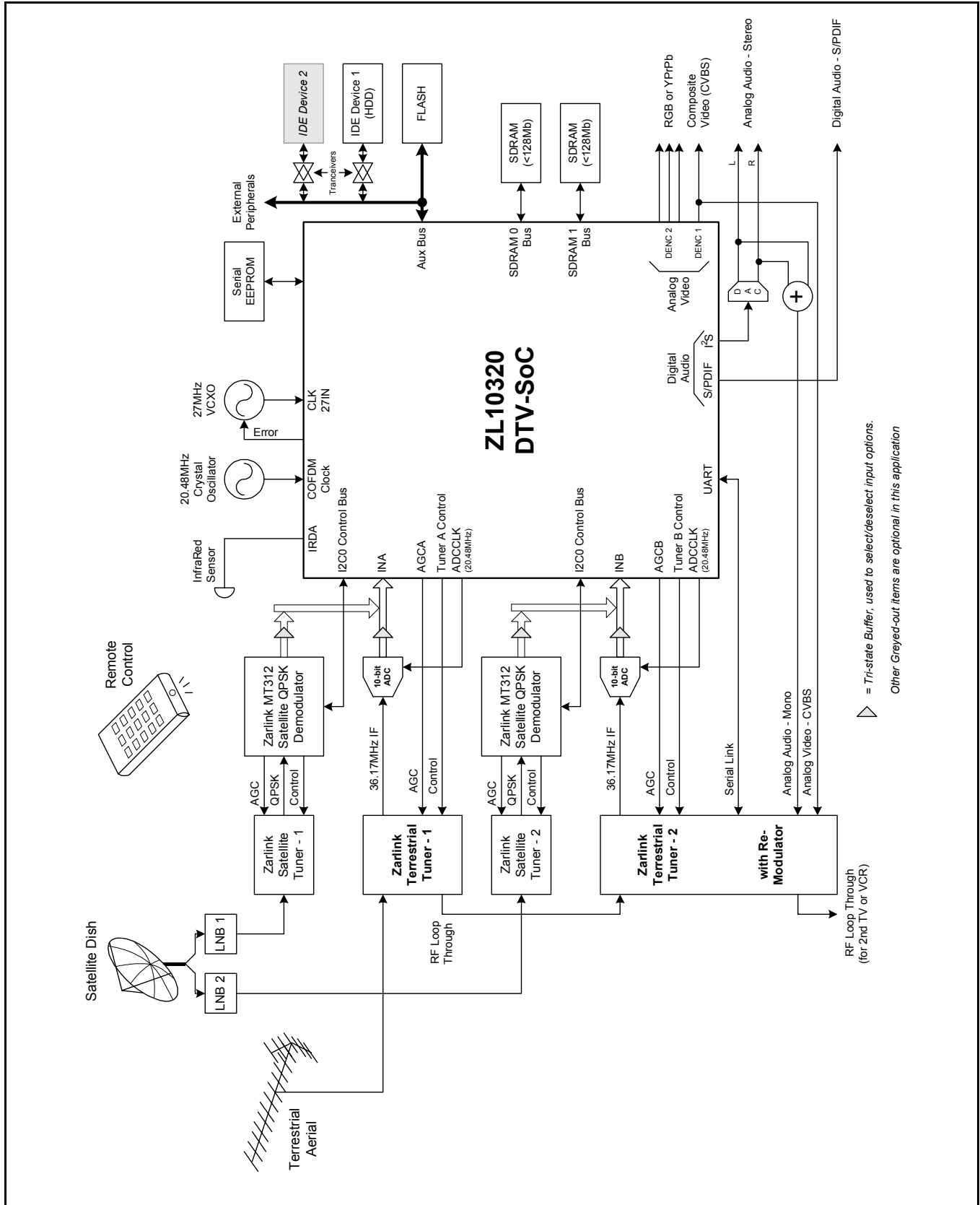


Figure 3 - Block Diagram of a Dual-Standard ZL10320 based Free-to-Air Terrestrial and Satellite PVR receiver

▷ = Tri-state Buffer, used to select/deselect input options.
 Other Greyed-out items are optional in this application

Standards Compliant

- ETSI EN300-744 (DVB-T)
- MPEG-2 Video & Audio
- Dolby® Digital for Multi-channel audio (ZL10321¹)
- Macrovision™ for copy protection support (ZL10321)

Complementary Products

- SL2610 single conversion tuner
- SL2001 up-down converter
- SL2009 IF AGC amp
- SL2150 antenna amplifier and power splitter
- SL1935 zero IF L-band tuner
- MT312 DVB-S QPSK demodulator

Customer Support

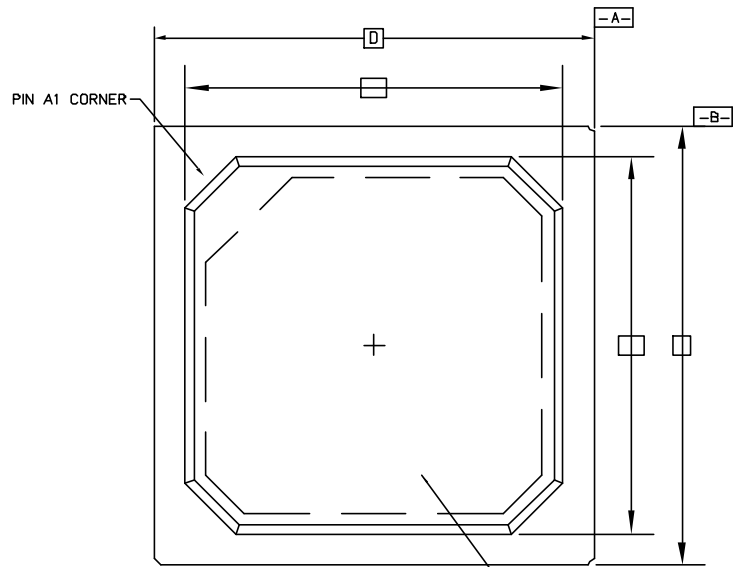
The ZL10320/321 devices are supported by Zarlink's network of in-house applications engineers and software design partners.

DVB® is a registered trademark of the DVB Project

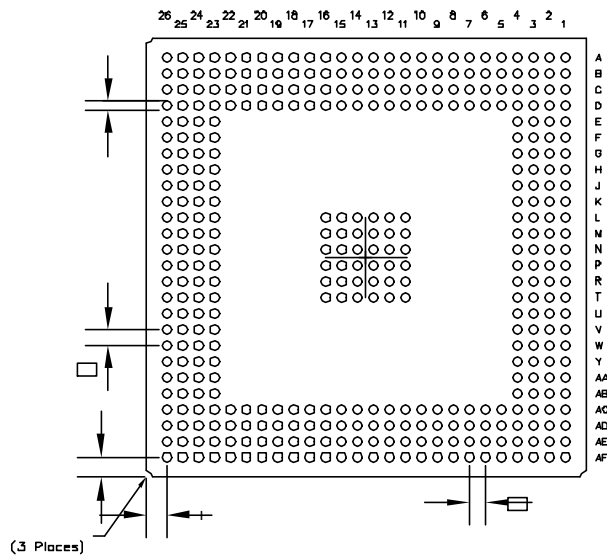
IBM®, the IBM Logo, PowerPC® and PowerPC405™ are trademarks of International Business Machines Corporation.

Dolby® is a trademark of Dolby Laboratories. Supply of this implementation of Dolby Technology does not convey a license or imply a right under any patent, or any other Industrial or Intellectual Property Right of Dolby Laboratories, to use this implementation in any finished end-user or ready-to-use final product. It is hereby notified that a license for such use is required from Dolby Laboratories.

This device is protected by US patent numbers 4631603, 4577216 and 4819098 and other intellectual property rights. Use of the Macrovision anticopy process in the device is licensed by Macrovision for non-commercial, home and limited exhibition use only. Reverse engineering or disassembly is prohibited. A valid Macrovision license must be in effect between the purchaser of the ZL10321 IC and Macrovision Corporation. Additional per-chip royalties may be required and are payable by the purchaser to Macrovision.



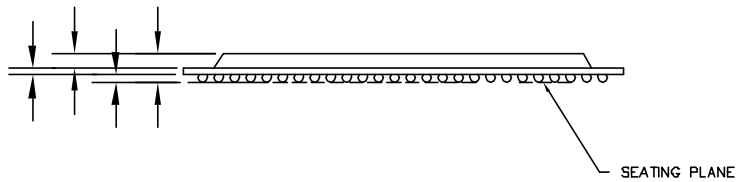
AVAILABLE MARKING AREA



SYMBOL	CONTROL DIMENSIONS (mm)			NOTE
	MIN.	NOM.	MAX.	
A	-	-	2.65	
A ₁	0.30	-	-	
A ₂	-	-	-	
D	26.80	27.00	27.20	
D ₁	25.00 BSC			
E	26.80	27.00	27.20	
E ₁	25.00 BSC			
I	-			
J	-			
b	0.50	0.60	0.70	
c	-			
d	-			
e	1.00			
f	-			

NOTES: -

1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ANSI Y14.5M-1994
2. THIS DWG CONFORMS TO JEDEC MS-034A



© Zarlink Semiconductor 2002 All rights reserved.

ISSUE	1			
ACN	213807			
DATE	25Nov02			
APPRD.				



Previous package codes

Package Code

Package Outline for
388EPBGA 27 x 27

GPD00807



**For more information about all Zarlink products
visit our Web Site at
www.zarlink.com**

Information relating to products and services furnished herein by Zarlink Semiconductor Inc. or its subsidiaries (collectively "Zarlink") is believed to be reliable. However, Zarlink assumes no liability for errors that may appear in this publication, or for liability otherwise arising from the application or use of any such information, product or service or for any infringement of patents or other intellectual property rights owned by third parties which may result from such application or use. Neither the supply of such information or purchase of product or service conveys any license, either express or implied, under patents or other intellectual property rights owned by Zarlink or licensed from third parties by Zarlink, whatsoever. Purchasers of products are also hereby notified that the use of product in certain ways or in combination with Zarlink, or non-Zarlink furnished goods or services may infringe patents or other intellectual property rights owned by Zarlink.

This publication is issued to provide information only and (unless agreed by Zarlink in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. The products, their specifications, services and other information appearing in this publication are subject to change by Zarlink without notice. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. Manufacturing does not necessarily include testing of all functions or parameters. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to Zarlink's conditions of sale which are available on request.

Purchase of Zarlink's I²C components conveys a licence under the Philips I²C Patent rights to use these components in and I²C System, provided that the system conforms to the I²C Standard Specification as defined by Philips.

Zarlink, ZL and the Zarlink Semiconductor logo are trademarks of Zarlink Semiconductor Inc.

Copyright Zarlink Semiconductor Inc. All Rights Reserved.

TECHNICAL DOCUMENTATION - NOT FOR RESALE
