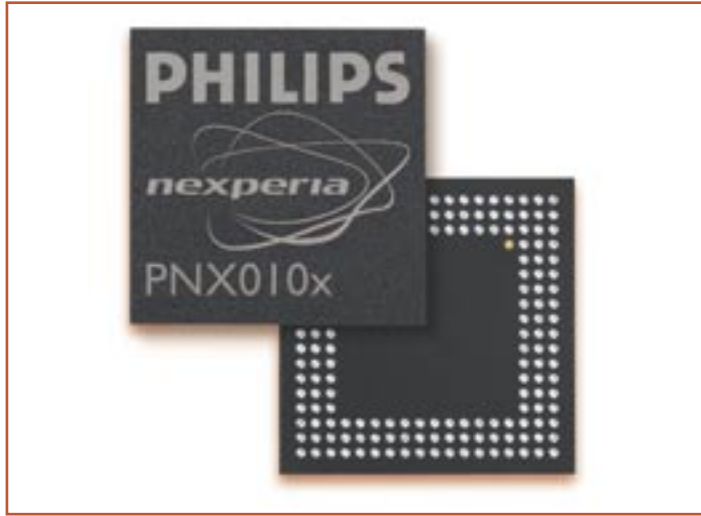


# PNX010x

## Nexperia IC solutions for portable audio and multimedia players

The Nexperia Personal family of audio player ICs incorporates Philips' world-class expertise in digital audio to deliver single chip solutions for portable Flash memory and hard disk MP3 players.



### Applications

- Flash MP3 audio player
- HDD MP3 audio player
- HDD audio player / picture viewer

### Key features

- Programmable architecture
- ARM processor core
  - ARM7TDMI (PNX0101/02)
  - ARM926EJ (PNX0105)
- Embedded program Flash (PNX0101/02)
- Epics audio DSPs
  - Supports Philips LifeVibes™ Music audio enhancement algorithms
- Small footprint package
  - TBGA180 (PNX0101/02)
  - LFBGA228 (PNX0105)
- Digital Rights Management

\* License agreements are required for compression/decompression technologies

The fast-moving market for portable flash and hard disk MP3 players demands ever-greater functionality and connectivity. With a significant share of the flash player market and a developing position in the rapidly growing hard disk player market, Philips is a leading supplier of powerful, flexible semiconductor solutions.

Based on Philips' long experience in digital audio applications, the latest addition to our extensive portfolio of audio ICs – the PNX010x family – provides advanced functionality for today's increasingly popular connected audio equipment. These versatile devices offer future-proof software architectures, very small form factors and low power solutions for a wide range of portable and fixed devices.

Providing a one-chip system solution for personal audio equipment, the powerful PNX0101/PNX0102 ICs are targeted at portable Flash MP3 players. They feature an embedded 32-bit ARM7TDMI processor and an EPICS7B audio co-processor to offer a very high level of integration through a single chip solution. And when complemented with our world-class software offerings, Philips Semiconductors is able to offer complete ready to-use systems.

With its integrated IDE interface, the PNX0105 is targeted at portable hard disk players. Incorporating the more powerful ARM926 core in addition to the EPICS7B audio DSP co-processor, this solution provides an excellent architecture for developing both portable audio players as well as portable players for image playback. The PNX0105 can also interface to video encoders to allow rendering of images on a TV set.

The programmable compatible architecture of the whole PNX010x family provides support for multiple audio decompression algorithms including MP3, AAC and Microsoft WMA\* as well as MP3 compression with LifeVibes™ Music SpeedDump. On-board embedded programmable Flash memory enables fully field-upgradeable solutions that keep pace with developing audio compression formats and offer increased program security.

# PHILIPS

# PNX010x

## Nexperia IC solutions for portable audio and multimedia players



Support for Digital Rights Management algorithms to prevent the copying of downloaded music content is an available option for these ICs. In addition, their ultra low power architecture enables solutions that can offer long battery lives.

The PNX010x family offers extensive design flexibility with possibilities for customized functionality. Philips can provide complete software stacks and development tools to help with fast product design and differentiation. They also support Philips LifeVibes™ Music audio enhancement algorithms, for even better audio performance.

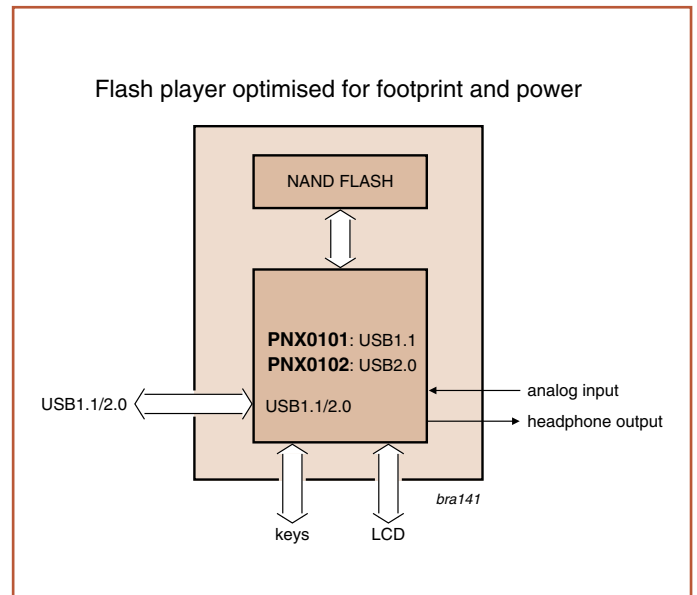
### PNX0101 and PNX0102 compressed audio player ICs

The PNX0101/PNX0102 ICs are ARM7 based solid-state audio devices offering a dedicated DSP for audio processing, embedded USB (PNX0101 offers USB1.1 and PNX0102 offers USB2.0) and a full 32-bit RISC processor with 8 Kbytes dedicated cache. These devices are designed for hand-held solid-state audio applications such as portable MP3 players. High levels of integration, low power consumption and high processor

performances make the PNX0101/PNX0102 ICs ideal for portable hand-held devices. Optimized for applications with Flash memory storage, these true one-chip solutions offer small footprints and can deliver over 50 hours of MP3 playback on one battery.

### Key features

- Programmable architecture
- FM Radio input and control support
- ARM7TDMI with 8 Kbytes cache
- Embedded memory: 64 Kbytes SRAM and 32 Kbytes ROM
- Integrated embedded program Flash (4 Mbits for PNX0101, 8 Mbits for PNX0102)
- External memory support: Nand Flash/Compact Flash/MMC/SMC/SRAM/ROM/SDRAM
- Supports Philips LifeVibes™ Music audio enhancement algorithms
- Integrated MCI interface
- Small footprint TBGA180 package (10 x 10mm, 0.5 mm pitch)



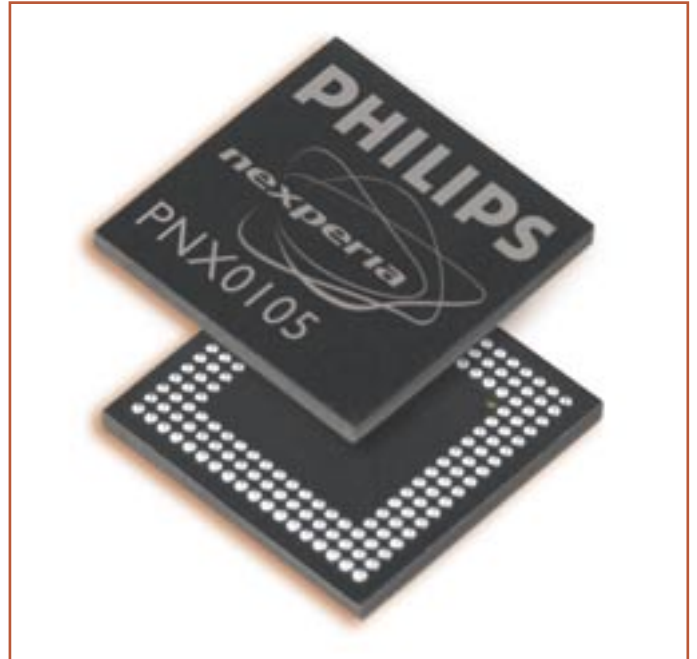
System solution diagram

### PNX0105, Multimedia IC for ATA/ATAPI devices

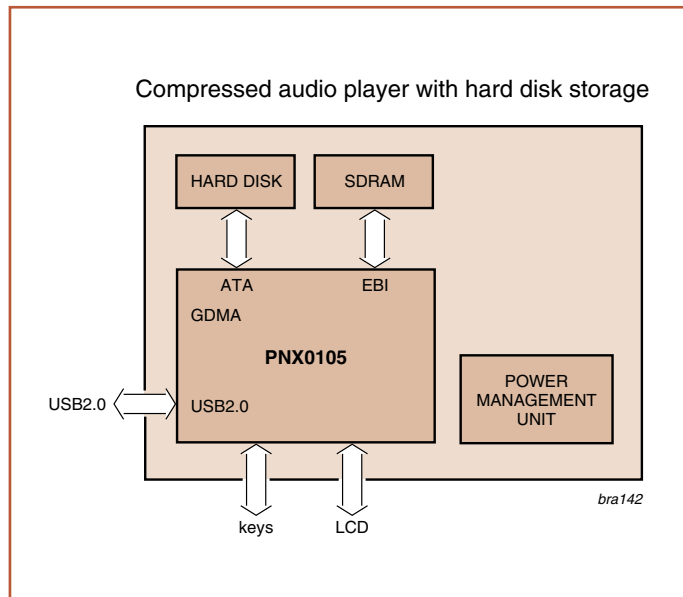
The PNX0105 is a highly integrated solution for compressed audio players and image viewing devices using ATA based storage appliances (hard disk, Compact Flash). Like our audio processors, its high level of integration, low power consumption and high processor performance make it ideal for portable hand-held devices.

It is based on the powerful ARM926EJ CPU core, a full 32-bit RISC processor implemented with 16 Kbytes data cache and 16 Kbytes instruction cache. A power-optimized 24-bit DSP core handles the audio streaming and post-processing and an IDE interface for hard disk storage offers UDMA / PIO mode support. It also features an embedded USB2.0 (HS) controller for fast data transfer, a GDMA interface and is prepared for digital rights management standards.

The PNX0105 is a natural fit for audio/image storage applications. Its ARM9 processor is well suited for decoding large images with fast response time. Content can be transferred using a card slot or USB OTG/Host and offers rendering of images on color LCD Composite TV out (with TV encoder).



PNX0105



System solution diagram

### Key features

- Programmable architecture enables support of multiple audio decompression algorithms
- ARM926EJ with 16 Kbytes data cache and 16 Kbytes instruction cache
- Embedded memory: 64 Kbytes SRAM and 32 Kbytes boot ROM, with extension up to 72 Kbytes RAM when using the DSP P-RAM memory
- External memory support for three static memory devices: SRAM/ROM, Sync Flash (up to 2 Mbytes) and SDRAM (up to 256 Mbytes).
- Architecture prepared for over 20 hours of MP3 playback on one battery
- Audio DSP for support of Philips' LifeVibes™ Music audio enhancement algorithms
- Integrated IDE/PC-card host for ATA/ATAPI and PC-card devices
- Integrated USB 2.0 high speed compliant slave interface
- Small footprint packages for production (12x12 mm)

# PNX010x

## Nexperia IC solutions for portable audio and multimedia players



Product type	PNX0101	PNX0102	PNX0105
Descriptive items	4 Mbit Flash USB1.1	8 Mbit Flash USB2.0	USB2.0
<b>Main functionality</b>			
Processor	ARM7TDMI	ARM7TDMI	ARM926EJ-S
Performance (MHz)	60	60	140
Cache (Kbytes)	8 unified	8 unified	16/16
MMU	no	no	yes
ROM (Kbytes)	32	32	32
Flash (Kbytes)	512	1024	no
SRAM (Kbytes)	64	64	64
Embedded power mgt.	yes	yes	no
<b>Audio co-processor</b>			
Processor	EPICS7B	EPICS7B	EPICS7B
Performance (MIPS)	80-100	80-100	80-100
Audio post-processing	yes	yes	yes
Compressed audio decoding	yes	yes	yes
Decoders supported <sup>1</sup>	MP3	MP3, WMA7/9, AAC	MP3, WMA7/9, AAC
<b>Other CODECs (on ARM)</b>			
Image decoders	slow rendering	slow rendering	fast rendering
Video decoders	N/A	N/A	low resolution
<b>Interconnectivity</b>			
USB Device FS (USB1.1)	yes	yes	yes
USB Device HS (USB2.0)	no	yes	yes
GDMA	no	no	yes
IDE (ATA/ATAPI/PC Card)	no	no	yes
<b>Package</b>			
Type	TFBGA180	TFBGA180	LFBGA228 <sup>2</sup>
Size (mm)	10x10	10x10	15x15
Pitch (mm)	0.5	0.5	0.65
<b>Schedule</b>			
Samples	Oct 03	May 04	May 04
Production start	Mar 04	Jun 04	Dec 04
<b>Planned applications</b>			
Flash MP3 player	Dec 03	Apr 04	Possible
HDD MP3 player	possible	Sep 04	Apr 04
MP3 CD player	no <sup>3</sup>	no	No

- <sup>1</sup> Audio decoders can be run on both the ARM core as well as the audio co-processor. The section on audio processor lists the decoders available for this DSP.
- <sup>2</sup> Development samples will be supplied in this package. Production package is 12x12 mm.
- <sup>3</sup> It is possible to combine the PNX0101 with a servo DSP that includes the block decoder.

### Philips Semiconductors

Philips Semiconductors is a worldwide company with over 100 sales offices in more than 50 countries. For a complete up-to-date list of our sales offices please e-mail [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com). A complete list will be sent to you automatically. You can also visit our website <http://www.semiconductors.philips.com/sales>.

### © Koninklijke Philips Electronics N.V. 2004

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.



Date of release: July 2004  
Document order number: 9397 750 13433

Published in The Netherlands