Product Brief
November 2011
Revision 1.0

NPCA110B Audio Enhancing Engine and CODEC

General Description

The Nuvoton NPCA110B device is a member of Nuvoton's Sound Enhancing family optimized for low cost TV, portable devices such as docking stations for MP3-players and mobile phones, Multi-Media speakers, PC monitor speakers and Boom boxes.

The NPCA110B integrates Waves® MaxxAudio-3 Lite sound enhancement algorithms. These are proprietary, patented, psychoacoustic algorithms that compensate for the acoustic limitations of small CE devices.

MaxxAudio-3 Lite algorithms enable reproduction of rich content, with a wide dynamic range and a full frequency range, on a limited audio system. For low-frequency reproduction, MaxxBass® uses a patented psychoacoustic technique to create a perceived low bass, which can be extended up to 1.5 octaves lower than the original. This technique reproduces full and rich sounding bass tones. Power handling is done by MaxxVolume®, which utilizes the power amplifiers and speakers to their full extent yet avoids clipping and distortion.

The MaxxAudio-3 Lite software suite provides an additional algorithm to design a resonance-free audio system: Maxx-EQ provides a flexible equalizer with 10 bands.

The NPCA110B enables digital control over the volume and bass, replacing traditional analog potentiometers.

The Maxx family of devices includes:

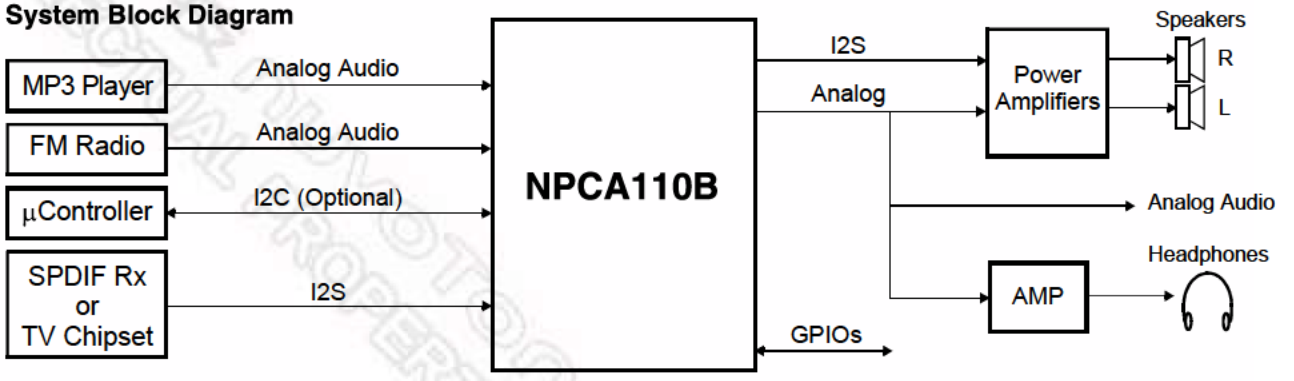
- High-performance, 24-bit audio enhancing engine pre-programmed with Waves MaxxAudio-3 Lite algorithms
- Optional Audio ADC
- Optional Audio DAC
- Digital I/O and other features for high-performance audio systems

The MaxxAudio Graphical User Interface (GUI) enables sound engineers to easily tune the device and customize presettings for different audio products.

Outstanding Features

- Improves audio quality for low-performance speakers
- System-level BOM savings
- Stereo operation
- I2C controlled
- 24-bit accuracy
- Audio algorithms
  - MAXXBASS®
  - MAXXEQ
  - MAXXVOLUME®
- Audio input
  - One I2S or Synchronous Serial Interface (SSI) input
  - Up to two stereo analog inputs: typical SNR of 90 dB; typical THD of –75 dB
- Audio output
  - One I2S or SSI output
  - Two analog outputs: typical SNR of 96 dB; typical THD of –86 dB
- Several General-Purpose digital signals available to the application (GPIOs)
- Typical operational power target of less than 0.15W
- Power-down target of less than 0.5 mW
- 3.3V operation

System Block Diagram



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Features

Bus Interfaces

- Synchronous Serial Interface (SSI)
  - Compatible with I2S
  - Master and slave timing support
- I2C Interface
  - Compliant with *I2C-BUS Specification Revision 1.0, 1992*
  - Master or slave interface
  - Supports 7-bit address mode

Audio Enhancing Engine

- Processing Unit
  - 24-bit accuracy
  - 90 MIPs

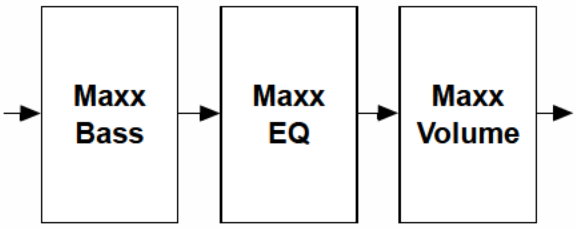
Audio Algorithms

- Sample frequency of 44.1 KHz or 48 KHz supported
- MaxxBass®
  - Patented Waves MaxxBass psycho-acoustic bass extension delivers a more natural sound than traditional bass boost technologies, which use EQ and can overpower your system. MaxxBass analyzes low frequencies to create harmonics that are perceived as lower, deeper tones.
- MaxxEQ
  - MaxxEQ provides the ability to design EQ curves and shape sound with surgical precision, using up to 10 programmable filters with bell, shelf, low pass, and high pass, plus adjustable frequency, gain, and Q parameters. MaxxEQ's intuitive Graphic User Interface makes click-and-drag filter design fast and easy.
- MaxxVolume®
  - MaxxVolume is an all-in-one volume control, with High-Level Compression to increase RMS levels, Low-Level Compression to increase the clarity of soft sounds, Noise Gating to eliminate signal and system noise, and Leveling to smooth out volume levels.

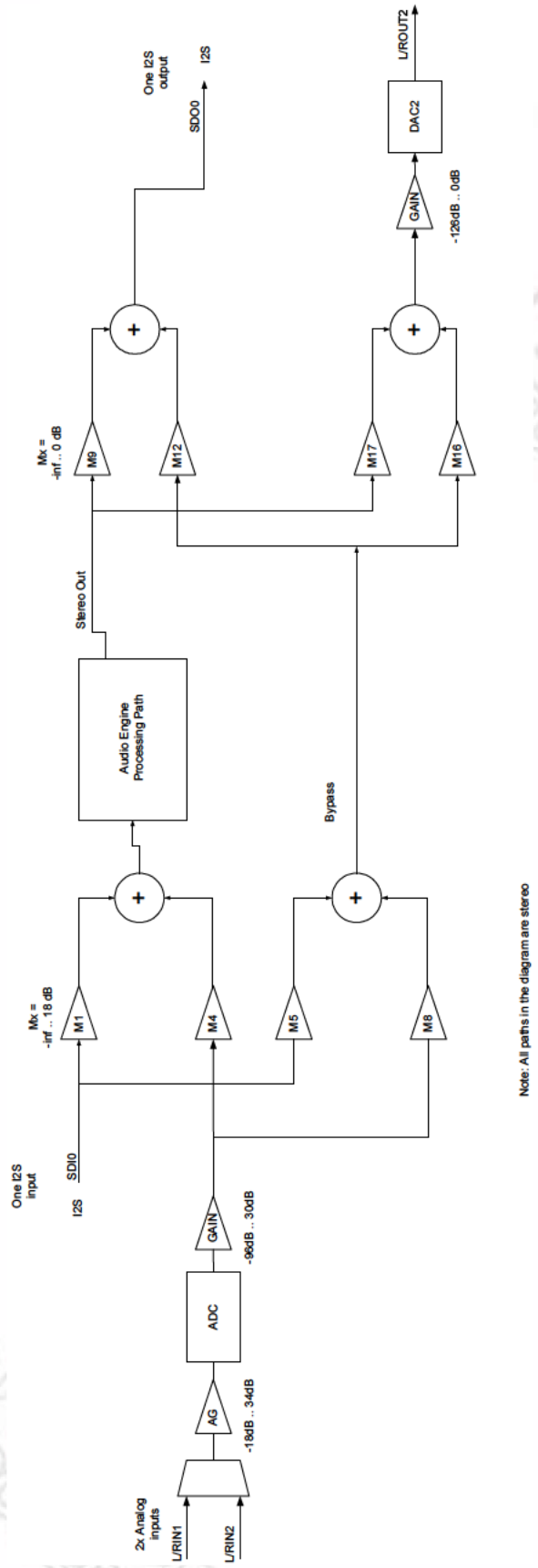
Straps, Clocks, Supply and Package Information

- Strap Input Controlled Operating Modes
  - PLL reference clock select (REF strap)
  - Test mode select (nTEST strap)
  - I2C master or slave select (I2CMS strap)
  - Boot options
    - ROM code operation
    - Loadable algorithms for new functions or ROM code patching
- Input Clocks
  - SSI / I2S clock: 64 x sample frequency
  - Optional crystal oscillator or input clock
- Power Supply
  - 3.3V supply operation
- Power-Save Modes
  - Clock switch to a lower frequency
  - WAIT state (clock stopped)
  - PLL power-down
- Package
  - 5 x 5 mm, 32-pin Quad Flat No-Lead (QFN) package

Algorithm Processing Chain



Features (Continued)

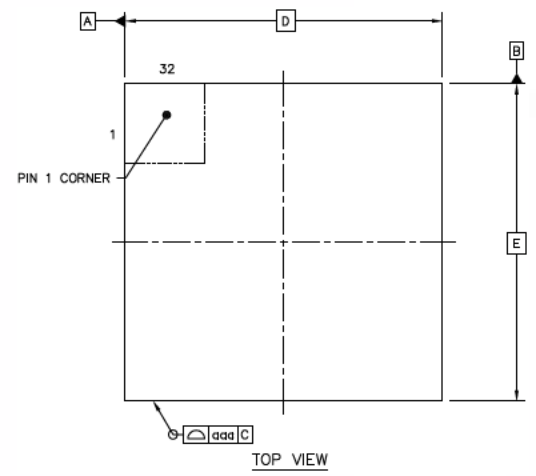


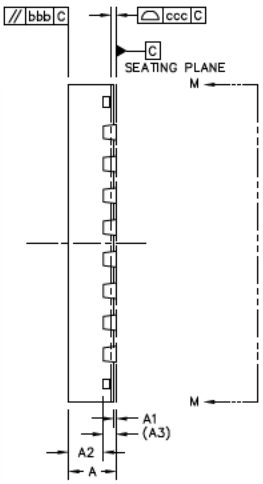
Note: All paths in the diagram are stereo

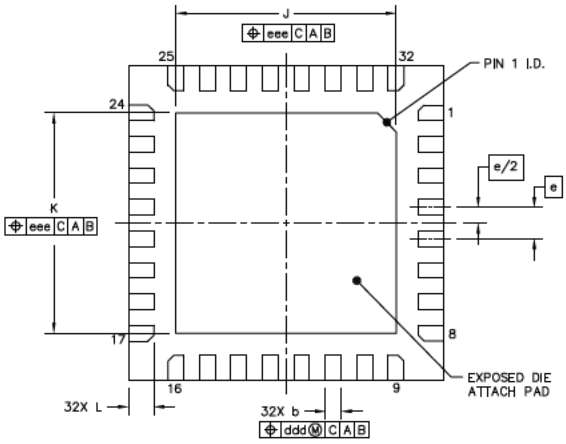
Figure 1. Device Block Diagram

Physical Dimensions

Control dimensions are in millimeters.







		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.7	0.75	0.8
STAND OFF		A1	0	0.035	0.05
MOLD THICKNESS		A2	---	0.55	0.57
L/F THICKNESS		A3		0.203 REF	
LEAD WIDTH		b	0.2	0.25	0.3
BODY SIZE	X	D		5 BSC	
	Y	E		5 BSC	
LEAD PITCH		e		0.5 BSC	
EP SIZE	X	J	3.4	3.5	3.6
	Y	K	3.4	3.5	3.6
LEAD LENGTH		L	0.35	0.4	0.45
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		bbb		0.1	
COPLANARITY		ccc		0.08	
LEAD OFFSET		ddd		0.1	
EXPOSED PAD OFFSET		eee		0.1	

NOTES

1.0 COPLANARITY APPLIES TO LEADS, CORNER LEADS AND DIE ATTACH PAD.

32-Pin Quad Flat No-Lead (QFN) Package
Order Number: NPCA110BA0YX

Device topside mark specification:

1st Line: **Part number - NPCA110B**
2nd Line: **A0YX YWW.**
A0 - End of part number; 'Y': QFN package indicator;
'X': Green package finish indicator.
YWW: Date Code.
3rd and 4th Lines: Nuvoton proprietary information.

Date code: **YWW, where Y is the year and WW is the week. For example, date code 035 indicates that device assembly was done on week 35, year 2010.**

NPCA110B
A0YX YWW
ZZ ZZZZZZ
ZZZZZ

Important Notice

Nuvoton products are not designed, intended, authorized or warranted for use as components in systems or equipment intended for surgical implantation, atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, or for other applications intended to support or sustain life. Furthermore, Nuvoton products are not intended for applications wherein failure of Nuvoton products could result or lead to a situation wherein personal injury, death or severe property or environmental damage could occur.

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