



Good Sound for All Mankind



Value Proposition: Customer Convenience

Balancing consumer needs and manufacture requirements is often very difficult. So how can you develop a low-cost, high-quality sound system that has easy system implementation, low bill-of-material costs, fast time-to-market and strong differentiating points? The answer is found in Pulsus digital audio solutions which are each made with all essential components to run a full audio system (see diagram below).

Pulsus technologies has created a line of digital audio semiconductor solutions that can challenge any audiophiles claims that digital audio systems struggle to produce emotional and natural sound. Through digital-to-digital conversion (DDC), Pulsus is able to give any audio system bit-perfect sound that is completely unaffected by analog noise. This accompanied by state-of-

the-art digital signal processing technologies such as SoundDesign™ and SmartTune™ enables Pulsus digital audio chips to give musical master pieces a distinct crisp and clean sound that analog audio solution has not been unable to accomplish.

Along with this cutting-edge technology, Pulsus provides an easy-to-use graphic interface software that can be used to adjust and emulate your audio system to the sound you are looking for. If further assistance is needed, Pulsus also offers expert guidance from our highly-trained sound engineers to make sure that your audio system will perform at the highest degree.

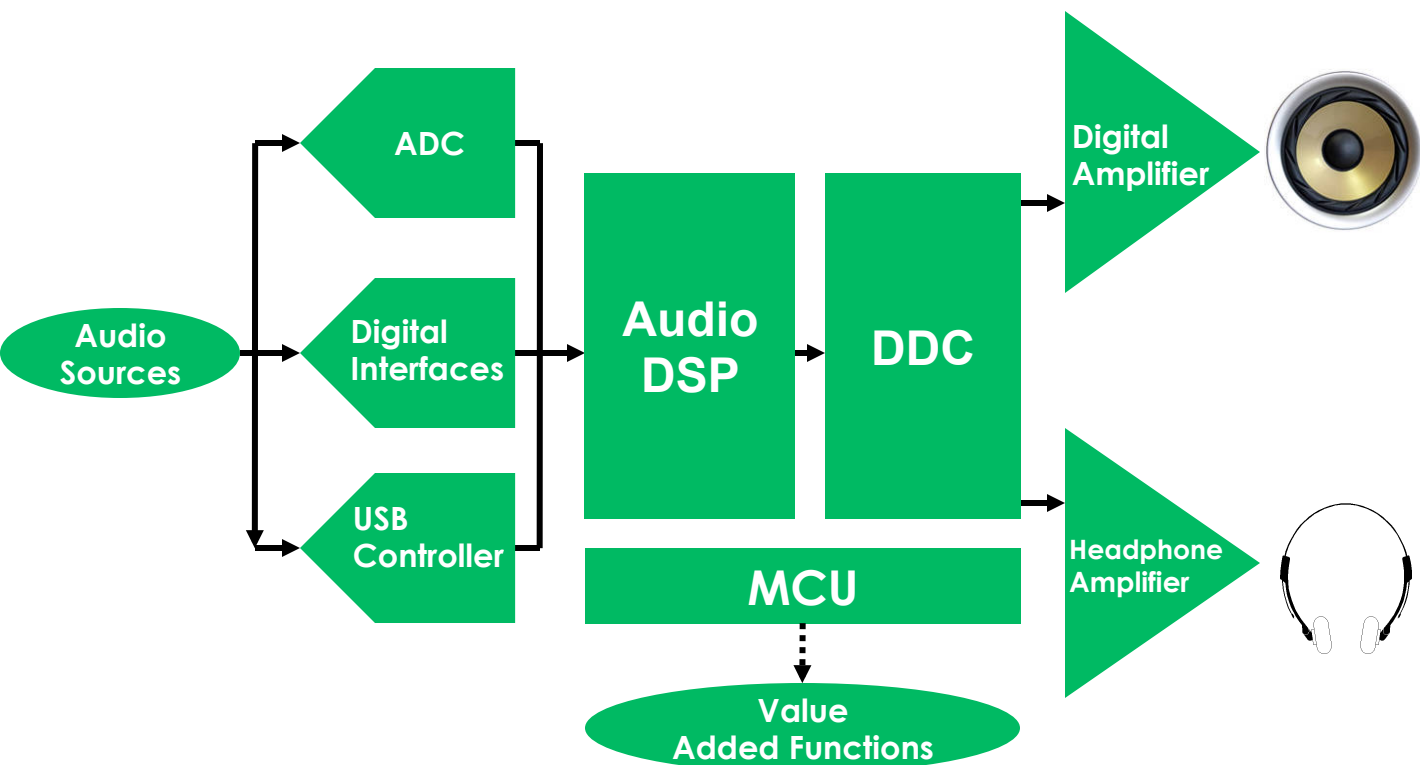
Choosing the chip that best fits the audio system you will develop is the first step and this selection guide will help do just that.

Pulsus Advantages:

- Superb sound quality
- Extensive sound processing
- Leading industry trend
- Easy-to-use
- High-efficiency and low power consumption
- Low bill-of-material

What we Offers:

- IC solutions
- System engineering support and audio tuning services
- Application-specific modules
- Board level system products
- Turn-key system solutions



Product Line-up by Product Groups

Current

Q1.2012 

Low Power Audio

Audio ADC

8106

DDC +
Digital amplifier

7131

7132

702

7130

USB audio integrated with MCU

USB device
controller
+
Digital amplifier/
audio processor

8536

8538

8535

8235

USB host/device
controller +
Digital amplifier/
audio processor

8645

8635

ARM

Audio
application
processor

6141

6418

Multi-ch Audio

Programmable
audio DSP

5331

9830B

9850

9860

DDC

9831

9851

9861

* DDC: PWM Audio Processor based on PULSUS' Direct Digital Conversion technology

Digital Amplification Power Stage

2022

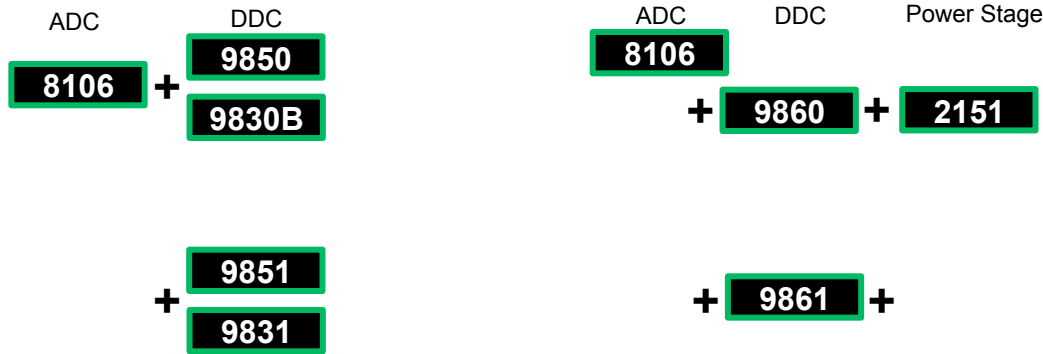
2151

Product Line-up by Applications

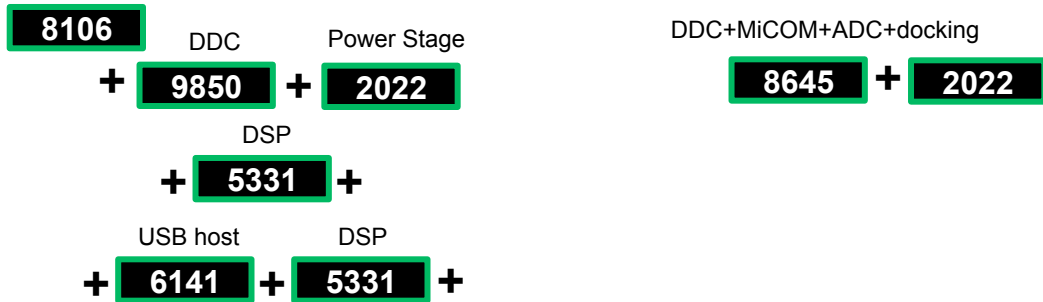
Current

Q1.2012 

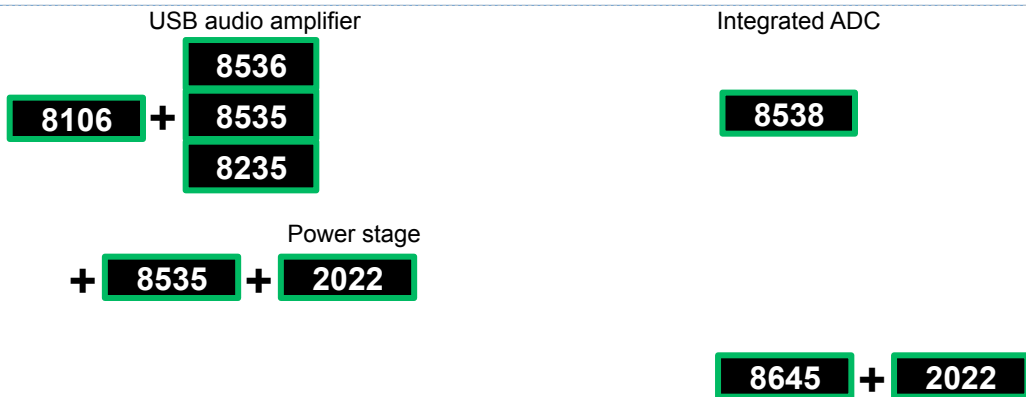
Home-Theater In-a-box/ Digital Amplifier	5.1-ch/7.1-ch (Including subwoofer)
	< 4-ch



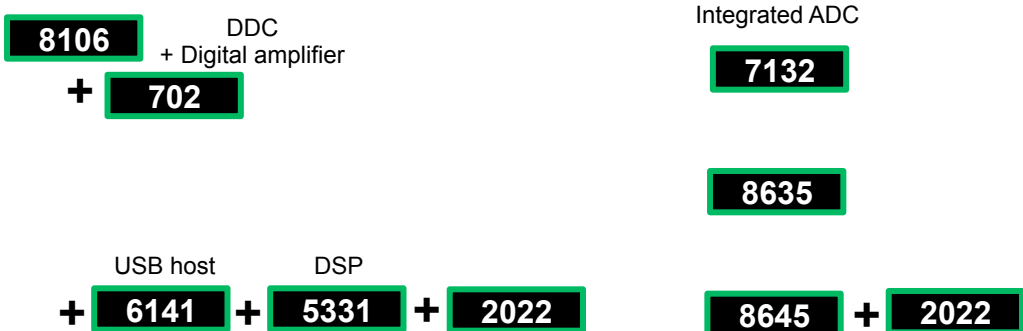
Soundbar	Passive (AUX) soundbar
	Standard (AC3) soundbar
	Soundbar with digital docking



Computer Speaker	USB powered, stereo out (USB streaming)
	High power stereo out (USB streaming)
	2.1/2.2-ch out (USB streaming)



iPod/iPhone/iPad/ Smartphone Dock	Stereo analog docking speaker
	Stereo digital docking speaker
	2.1/2.2-ch digital docking speaker



Smartphone /Smart Tablet



5.1-ch/7.1-ch System

9850

Blu-ray compatible (192kHz 8ch. input)
 Sound processing : 192kHz, 30x24/54
 Fully programmable equalizer
 Two 8-ch. I2S input
 8-ch. PWM out / Headphone PWM out

9830B

DVD compatible (96kHz 8ch. input)
 Sound processing : 192kHz, 30x24/54
 Partial programmable equalizer
 Two 8-ch. I2S input and MIC I2S input
 Down mixer stereo I2S output
 8-ch. PWM out / Headphone PWM out
 Line PWM out

9860

Coming soon
 Acoustically enhanced sound
 New speaker/power stage protection functions
 Increased resolution, lower distortion

4-ch System

9851

Blu-ray compatible (192kHz 4ch. input)
 Sound processing : 192kHz, 30x24/54
 Fully programmable equalizer
 Two 4-ch. I2S input
 4-ch. PWM out / Headphone PWM out

9861

Coming soon
 Acoustically enhanced sound
 New speaker/power stage protection functions
 Increased resolution, lower distortion

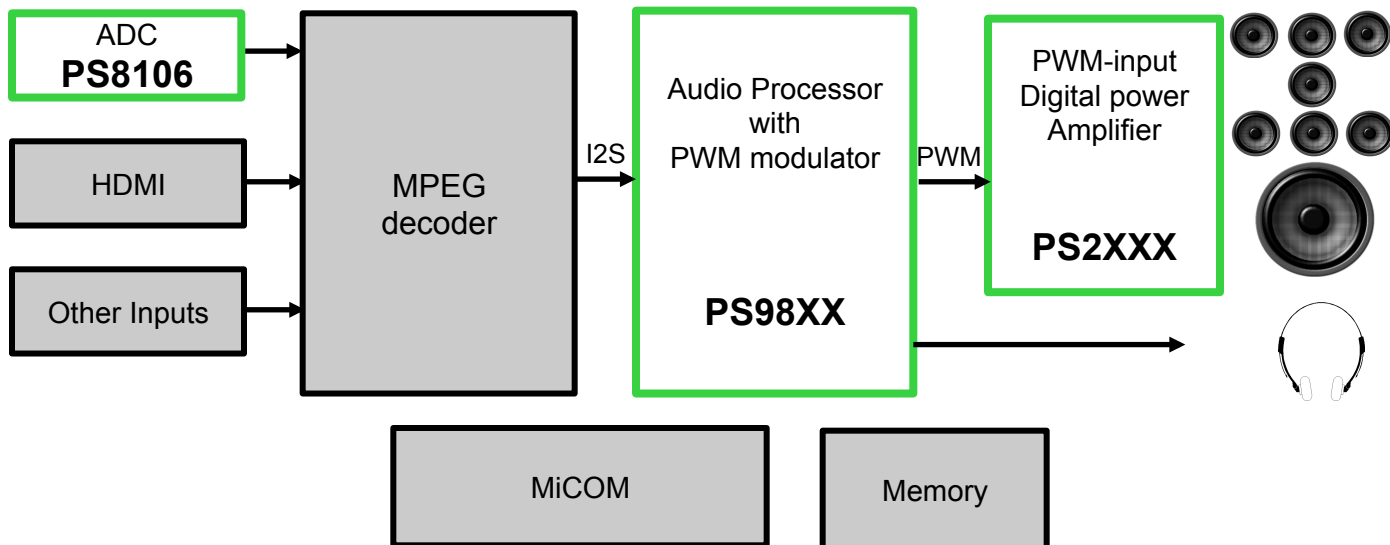
Digital Amplification Power Stage

2022

20Wx2ch, full-bridge
 10Wx2ch, half-bridge
 + 20Wx1ch, full-bridge
 30Wx1ch, parallel-full-bridge

2151

Coming soon
 High power amplifier (100~200W/ch)



[System configuration of Home-theater-in-a-box]

	9830B	9850
Asynchronous Sample Rate Converter		
Input Sampling Rate	13kHz~96kHz for all channels up to 192kHz for 2 channels	13kHz~192kHz for all channels
Input Sampling Rate Detection	O	O
Serial audio input		
Microphone Interface	O	-
I2S input	O	O
# of serial audio input channels	8 x 2	8 x 2
I2S output	O (with down-mix out)	O
Communication interface		
I2C interface	O	O
SPI interface	O	O
Hard-wired Sound Processor		
Master volume	18dB~-70dB	18dB~-70dB
Input mapper	O	O
# of limiter	4	4
Equalizer	4 biquad per channel Configurable 32 biquad (16 coefficient set)	Configurable 69 biquad (16 coefficient set)
Graphic/static equalizer	O	O
Pre mixer	△ (Partial mixing)	O
Post mixer	-	O
Bass manager	O	O
Down mixer	O	-
Arbitrary harmonic generator	-	-
PWM processing		
Dead time	O	O
PWM limit	O	O
Output channel mapping	O	O
# of PWM channels	8+2+1 channel	8+2 channel
Audio performance		
Signal to noise	>105dB	>100dB
Bandwidth	20~40kHz	20~40kHz
System monitoring / Protection for output stage		
Auto PWM off by output stage status	O	-
Output level monitoring	-	-
Interrupt output pin for real time status (SRC lock on/Specific level detection)	-	-
Output level limiter(auto gain limiter)	O	O

Soundbar (with AC3 decoding)

Audio DSP integrated with DDC

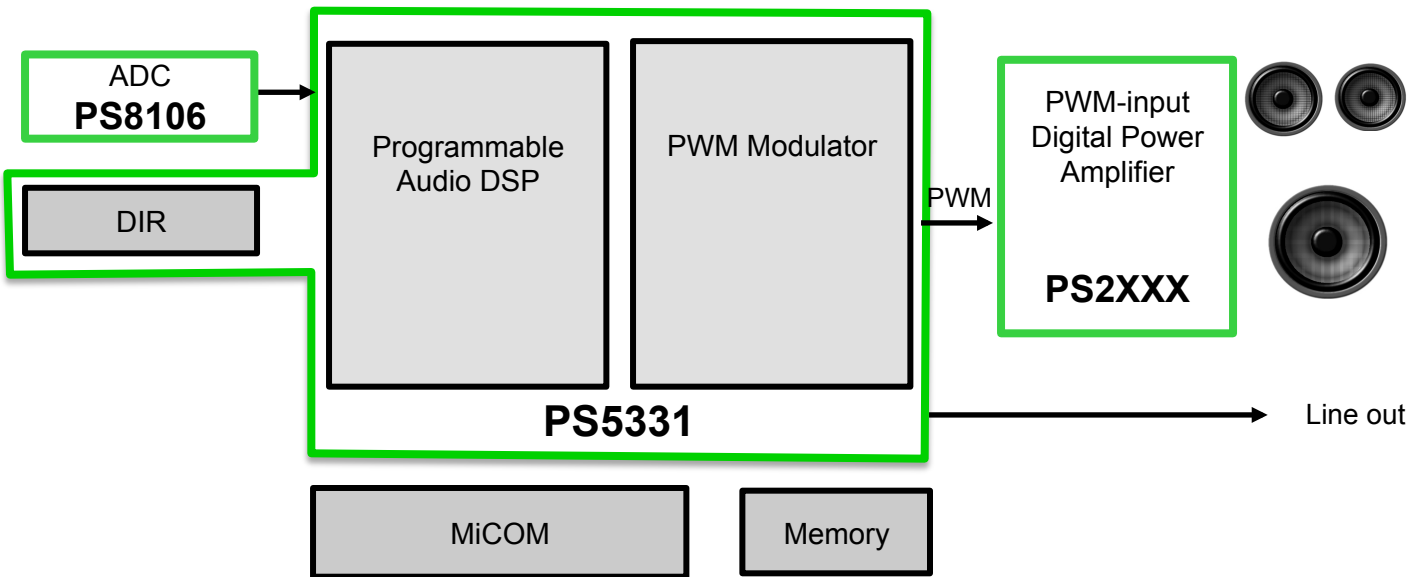
5331

Symphony™ programmable audio DSP
 - Max. Freq. 150MHz (195DMIPS)
 Highly extensive post processing without external memory
 3D/surround, Value-added post processing
 Hardwired sound processing coprocessor
 Integrated DDC with 12-channel PWM out

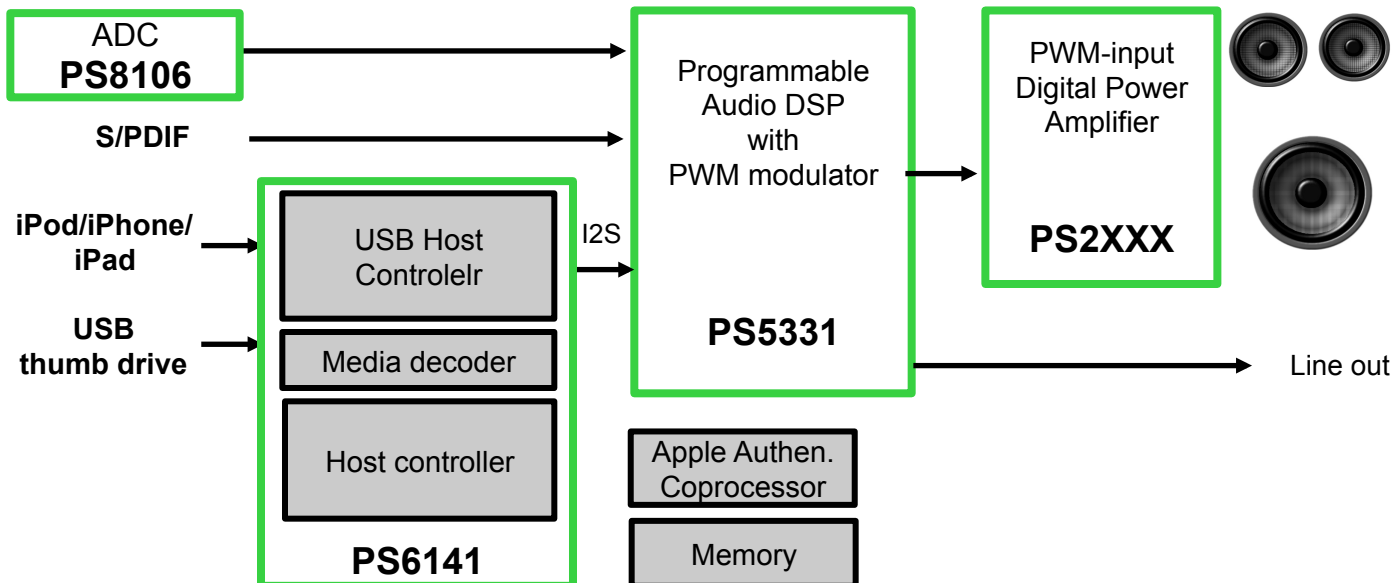
ARM processor with USB audio

6141

ARM7-based core processor
 Powerful system control, peripherals
 USB 2.0 full-speed host
 iPod/iPhone/iPad digital docking firmware, interface
 USB thumb drive with file system stack
 Media decoding



[System configuration of Standard Soundbar]



[System configuration of Value-added Soundbar]

Soundbar (with AC3 decoding)

5331

DSP Core

System clock	150MHz
DMIPS	195DMIPS

Internal Memory

Instruction memory (RAM)	128kByte
Data memory (RAM)	256kByte
System memory (RAM)	128kByte

Asynchronous Sample Rate Converter

Input Sampling Rate	13kHz~192kHz for all channels
Input Sampling Rate Setting	Active

Hard-wired Sound Processor

Equalizer	Configurable 138 biquad equalizer
Automatic gain limiter	8
Digital volume	0
Full matrix mixer	0

HD PWM engine

Dead time	0
PWM limit	0
Output channel mapping	0
# of PWM channels	12-channel

Serial audio input

Microphone Interface	0
Receiver mode of I2S	0
# of serial audio input channels	12
I2S output (with down mix)	0
S/PDIF input	3

Communication interface

I2C interface	0
SPI interface	0
UART	0

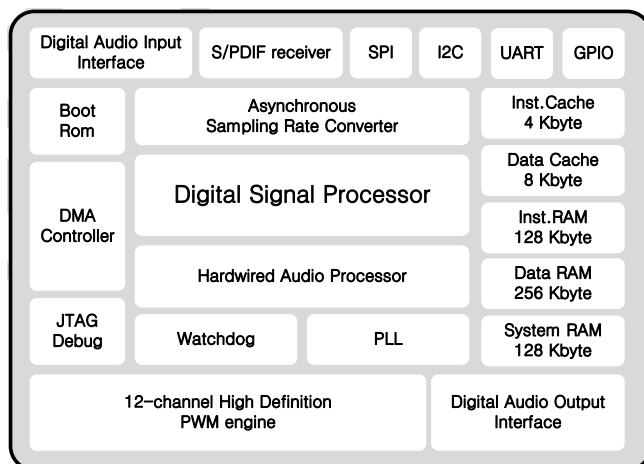
Value-added post processing algorithms

Sound Processing algorithms	Qsound QXpander
	QMSS
	QSurround
	QRumble
	QSizzle
	Pulsus Tuubilizer
	Pulsus Harmonizer
Pulsus Vocal down	

Audio performance

Signal to noise	>100dB
Bandwidth	20~40kHz

Package	128-pin 14x14 TQFP
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Soundbar (with AC3 decoding)

6141

Core processor

Core	ARM7 TDMI-based
Performance	132 MHz
Cache	8kB

Memory controller

SRAM interface	8-bit data bus width
Serial flash interface	1/2/4-bit
SDR interface	16-bit data bus width

Audio stream decoder

Performance	24-bit high performance fixed-point DSP
CODEC	MPEG-1, MPEG-2, WMA, LPCM, Layer 1, 2, 3 (MP3)

Clock & Power manager

Low power consumption	O
Power mode	Normal operating mode Stop mode

USB

USB host controller + PHY	USB host 2.0 full speed
Adaptive isochronous transfer for playback	O
USB thumb drive file system	O

Audio interface

USB audio input	O
I2S input	Stereo
I2S output	5-ch.
S/PDIF output	O

Peripherals

I2C interface	O
SPI interface	O
UART	O
JTAG interface	O
14-bit ADC	O (for key/encoder switch)
IR	O
Real-time clock/watch dog timer	O
GPIOs	O (up to 40 ports)

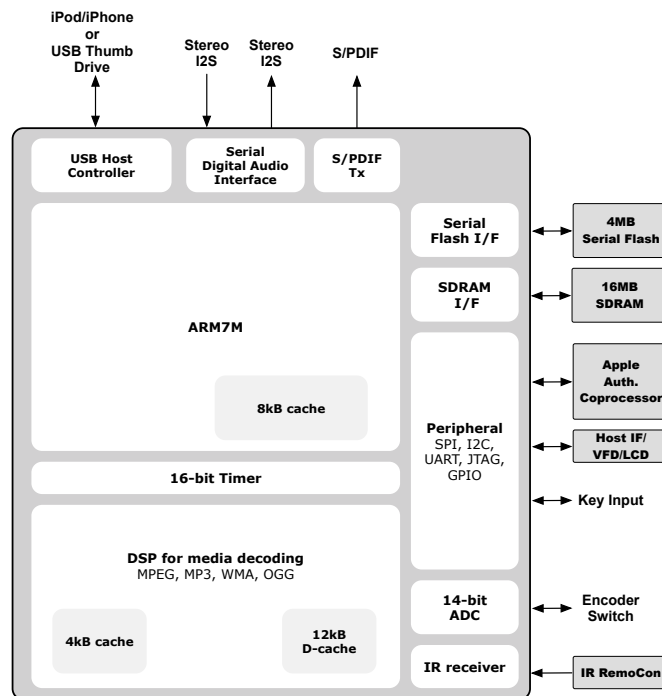
iPod/iPhone/iPad digital docking

Digital audio streaming via USB	O
Accessory protocol specification	O

SW for host control

SW framework supporting any user interface	O (key, encoder switch, IR, LCD/LED display)
Remote firmware update	O

Package	128-pin QFP
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Soundbar (without decoding)

DDC

9851

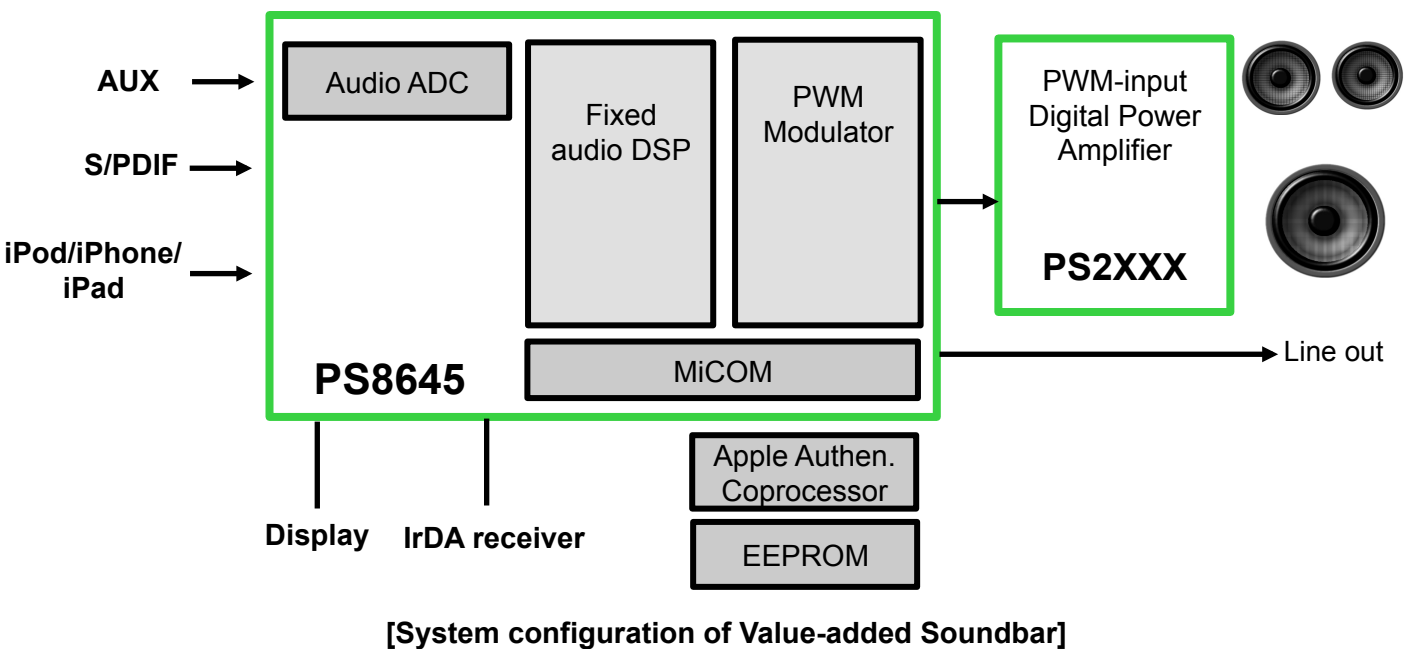
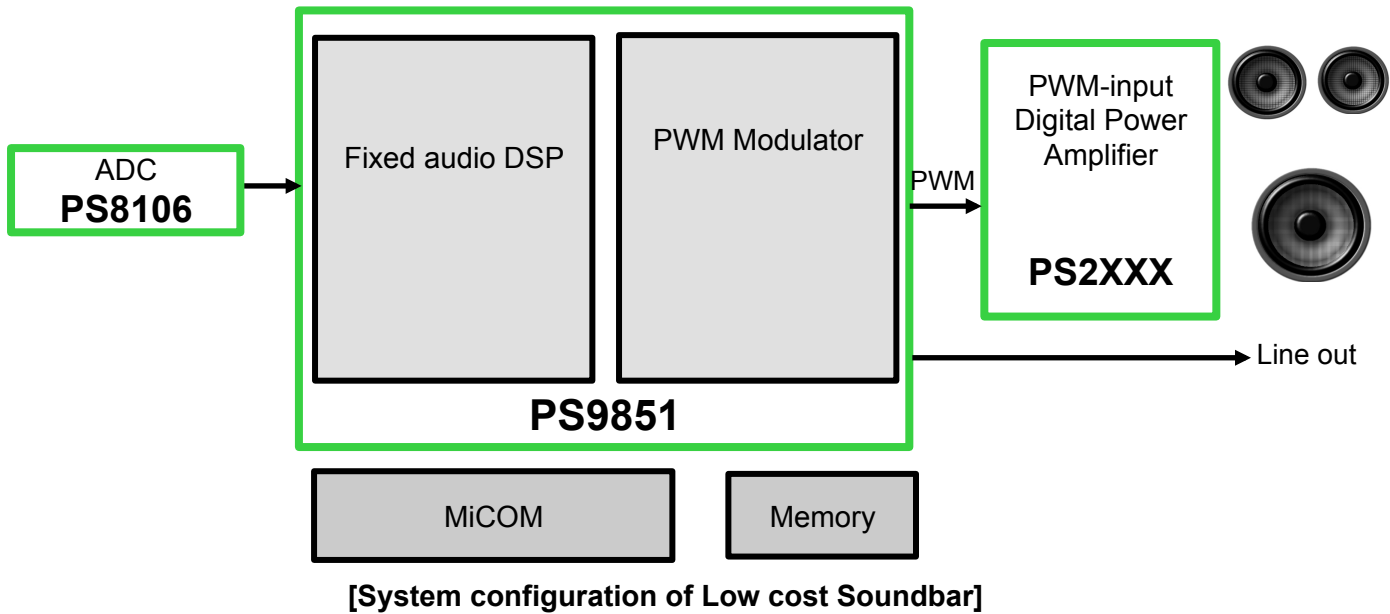
Blu-ray compatible (192kHz 4ch. input)
 Sound processing : 192kHz, 30x24/54
 Fully programmable equalizer
 Two 4-ch. I2S input
 4-ch. PWM out / headphone PWM out

Digital docking processor with MCU

8645

Coming soon

Single chip solution
 : (MCU, USB, ADC, fixed DSP, PWM)
 nDDC: Advanced HD PWM engine
 Turn-key SW solution to implement
 digital docking speakers
 4-ch. PWM output



Computer Speakers (USB powered speaker)

Stereo USB audio processor

8536

USB device 2.0 full-speed
 Power: USB power/external power
 Audio input: USB, stereo I²S
 On-chip fixed DSP
 Host controller: on-chip MCU, I2C, GPIOs
 Supports industry standard UI (key inputs)
 Full-digital amplifier with 5Wx2ch output

8535

USB device 2.0 full-speed
 Power: USB power/external power
 Audio input: USB, stereo I²S
 On-chip fixed DSP
 Host controller: on-chip MCU, I2C, GPIOs
 Supports industry standard UI (key inputs)
 Full-digital amplifier with 1Wx2ch output

8235

USB device 2.0 full-speed
 Power: USB power/external power
 Preset EQ, volume control
 Supports industry standard UI (key inputs)
 EEPROM is not required
 Full-digital amplifier with 1Wx2ch output

Stereo USB audio processor with ADC

8538

Coming soon

USB device 2.0 full-speed
 Power: USB power/external power
 Audio input: USB, AUX, stereo I²S
 On-chip fixed DSP
 Host controller: on-chip MCU, I2C, GPIOs
 Supports industry standard UI (key inputs)
 Full-digital amplifier with 5Wx2ch output

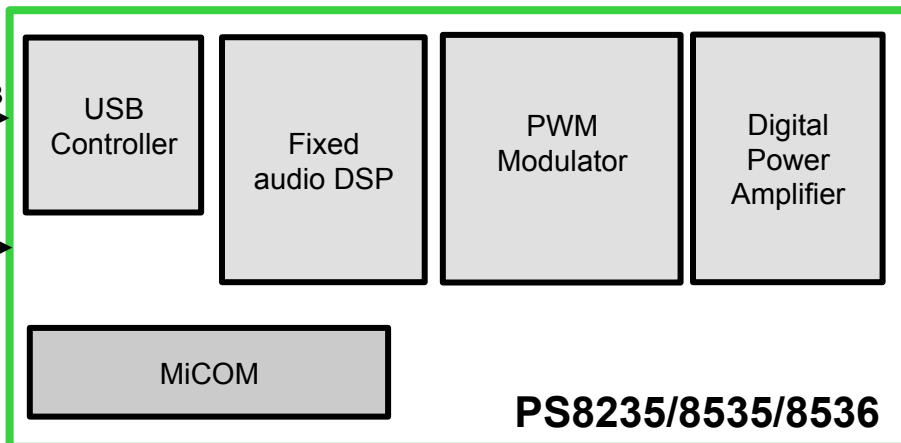
Advantages

Lossless Full-digital amplification and interface
 On-chip DSP: Superior sound quality and easy tuning
 Single chip solution

PC/Mac

USB

ADC (optional)
PS8106



PS8235/8535/8536

* Do not require when 8235 is used

EEPROM

[System configuration of USB powered speaker]

Computer Speakers (High power speaker)

2.0-ch. Computer speaker

8535

USB device 2.0 full-speed
 Power: USB power/external power
 Audio input: USB, stereo I²S
 On-chip fixed DSP
 Host controller: on-chip MCU, I2C, GPIOs
 Supports industry standard UI (key inputs)
 Stereo PWM output

2.1-/2.2-ch. Computer speaker

8645

Coming soon

Single chip solution
 : (MCU, USB, ADC, fixed DSP, PWM)
 nDDC: Advanced HD PWM engine
 Turn-key SW solution to implement
 digital docking speakers
 4-ch. PWM output

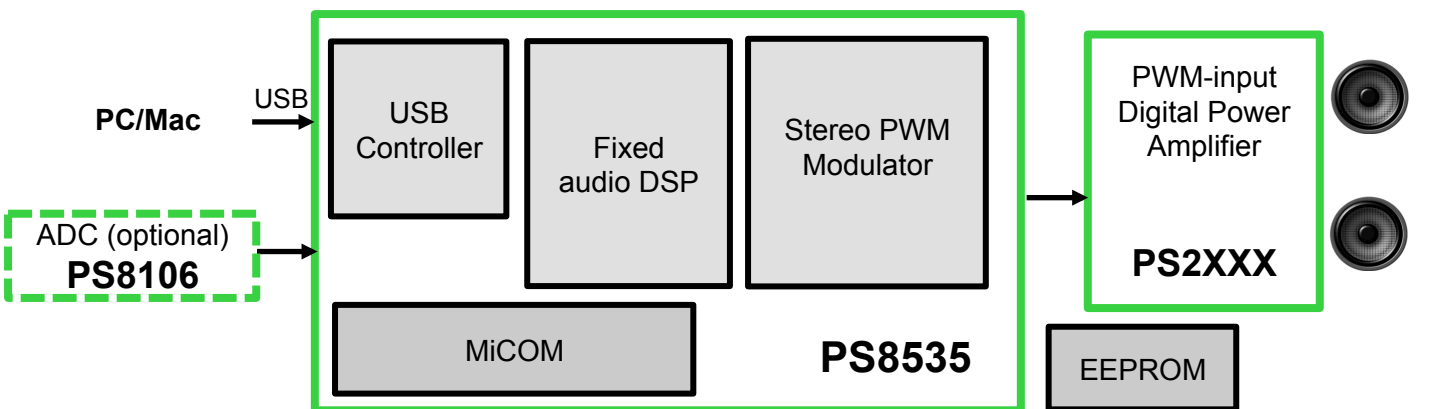
Digital Amplification Power Stage

2022

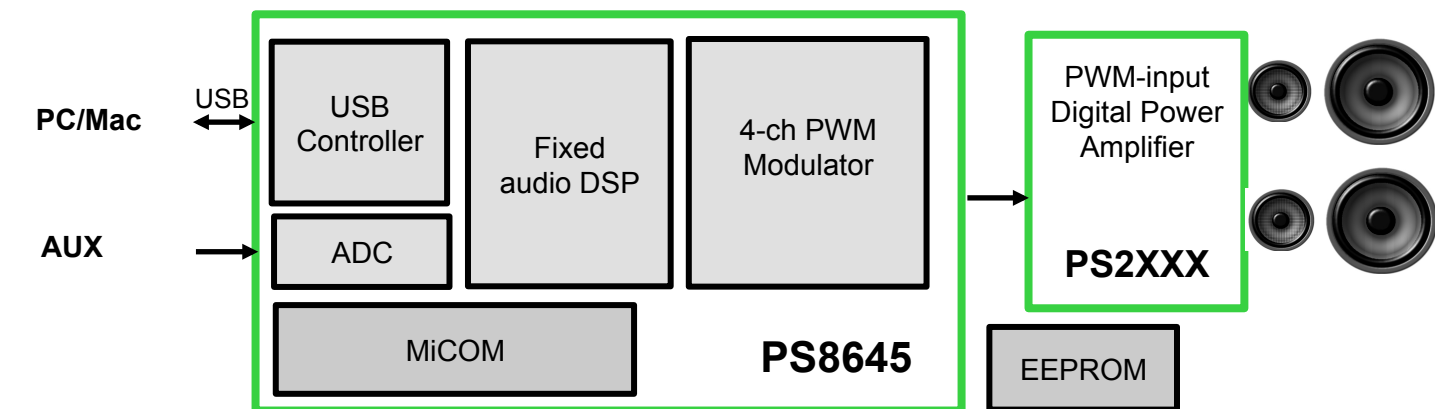
20Wx2ch, full-bridge
 10Wx2ch, half-bridge
 + 20Wx1ch, full-bridge
 30Wx1ch, parallel-full-bridge

Advantages

Lossless Full-digital amplification and interface
 On-chip DSP: Superior sound quality and easy tuning
 Easy-to-use and lower BOM



[System configuration of stereo high-power computer speaker]



[System configuration of 2.1-/2.2-ch high-power computer speaker]

Computer Speakers

	8235	8535	8536
USB device controller			
USB class	2.0 full-speed	2.0 full-speed	2.0 full-speed
Isochronous playback	O	O	O
OS compatibility			
Windows	98/XP/Vista/7	98/XP/Vista/7	98/XP/Vista/7
Mac OS X	Snow leopard, Lion	Snow leopard, Lion	Snow leopard, Lion
Power supply			
USB power	O	O	O
External power	AC / battery-powered	AC / battery-powered	AC / battery-powered
Asynchronous Sample Rate Converter			
Input Sampling Rate	Up to 96kHz	Up to 96kHz	Up to 96kHz
Input Sampling Rate detection	O	O	O
Audio input			
USB input	O	O	O
Serial digital audio input (I2S)	O	O	O
AUX-in	-	-	-
Communication interface			
I2C interface	O	O	O
On-chip DSP			
Digital volume control, mute	O	O	O
Digital volume boost	O	O	O
Bass boost	O	O	O
GPIO-preset equalizer	O	O	O
Equalizer	-	5 biquad x 2-channel	5 biquad x 2-channel
DRC	-	O	O
Bass/treble management	-	O	O
HD PWM engine			
Dead time	O	O	O
PWM limit	O	O	O
# of PWM channels	2 channel	2 channel	2 channel
Audio output			
Full-digital amplifier	1Wx2-ch (RMS) 3Wx2-ch (effective out)	1Wx2-ch (RMS) 3Wx2-ch (effective out)	5Wx2-ch (RMS) 7Wx2-ch (effective out)
PWM output	-	2-channel PWM out	-
Host controller			
Integrated MCU	8051-based MCU	8051-based MCU	8051-based MCU
Communication interface	GPIO	I2C, GPIO	I2C, GPIO
Internal memory	ROM	ROM, RAM	ROM, RAM
Supports external EEPROM	- (Not required)	O	O
Value-added functions			
User interface (key inputs)	O	O	O
VID, PID, String	-	O	O
Package	40-pin 5x5 eTQFN	40-pin 5x5 eTQFN	56-pin 7x7 QFN

iPhod/iPhone/iPad docking or Smartphone Speakers (Digital)

* Below are also able to be used as a differentiated solutions in the docking speakers for general smartphones if they have USB audio/SPDIF output

ARM-based digital docking processor

6141

ARM7-based core processor
Powerful system control, peripherals
USB 2.0 full-speed host
iPod/iPhone/iPad digital docking
firmware, interface
USB thumb drive with file system stack
Media decoding

2.1/2.2-channel Digital docking Speaker on a chip

8645

Coming soon

Single chip solution
: (MCU, USB, ADC, fixed DSP, PWM)
nDDC: Advanced HD PWM engine
Turn-key SW solution to implement
digital docking speakers
4-ch. PWM output

2-channel Digital docking Speaker on a chip

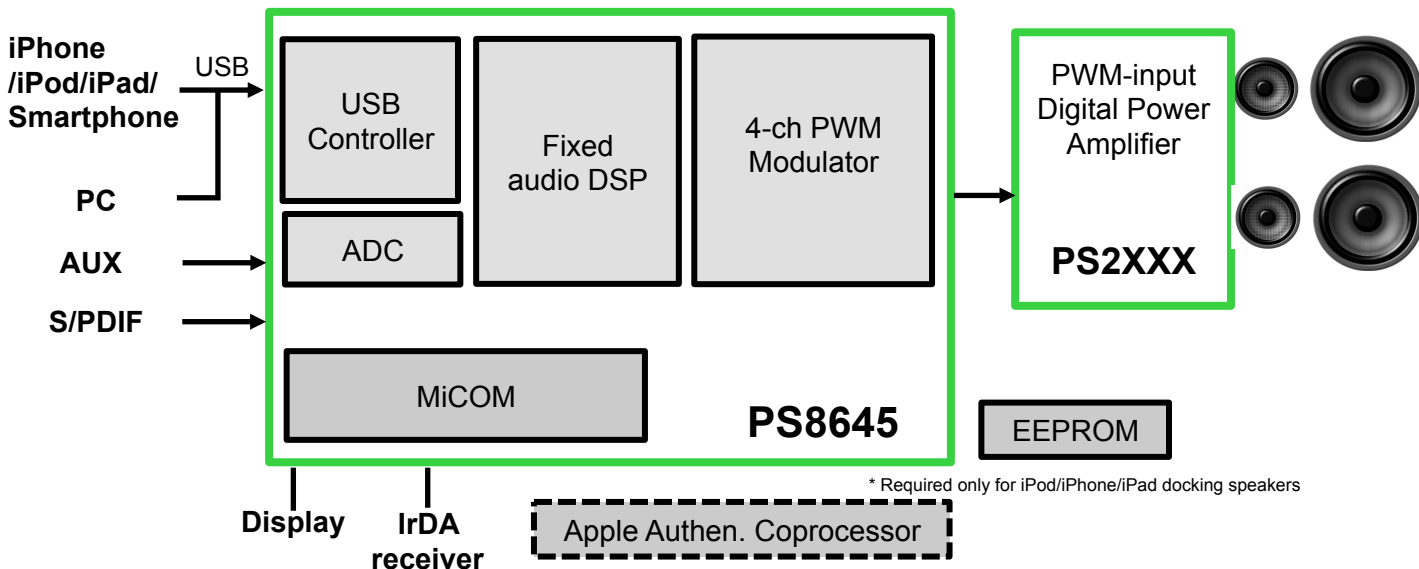
8635

Coming soon

Single chip solution: (MCU, USB, ADC,
fixed DSP, digital amplifier)
nDDC: Advanced HD PWM engine
Turn-key SW solution to implement
digital docking speakers
5W x 2-ch.

Advantages

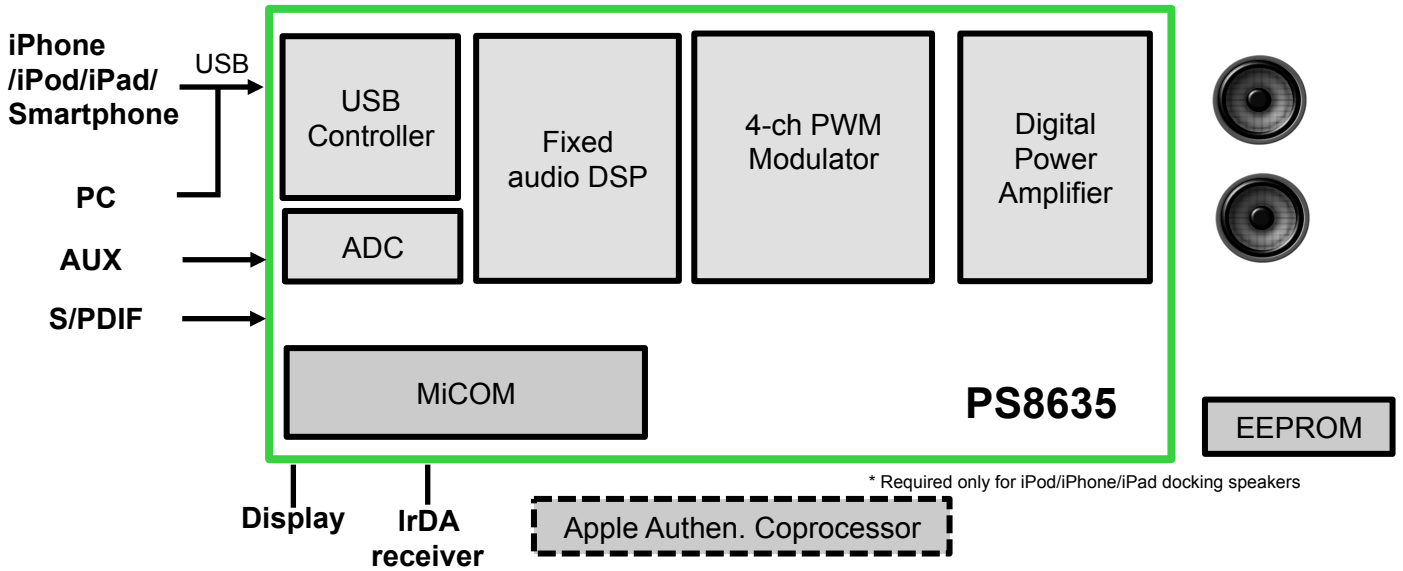
Lossless Full-digital docking and amplification
On-chip DSP: Superior sound quality and easy tuning
Supports all required software, firmware, and UI
Easy-to-design and low BOM: speaker in a single chip



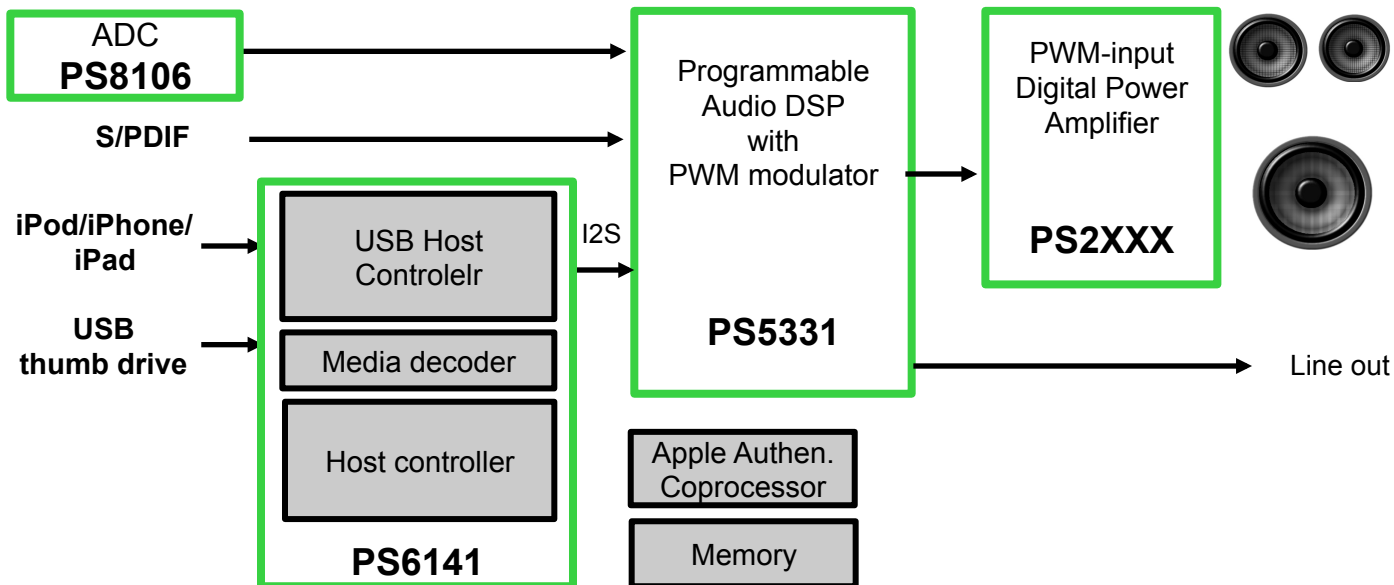
[System configuration of 2.0-/2.1-/2.2-ch digital docking speaker]

iPod/iPhone/iPad docking or Smartphone Speakers (Digital)

* Below are also able to be used as a differentiated solutions in the docking speakers for general smartphones if they have USB audio output or S/PDIF output



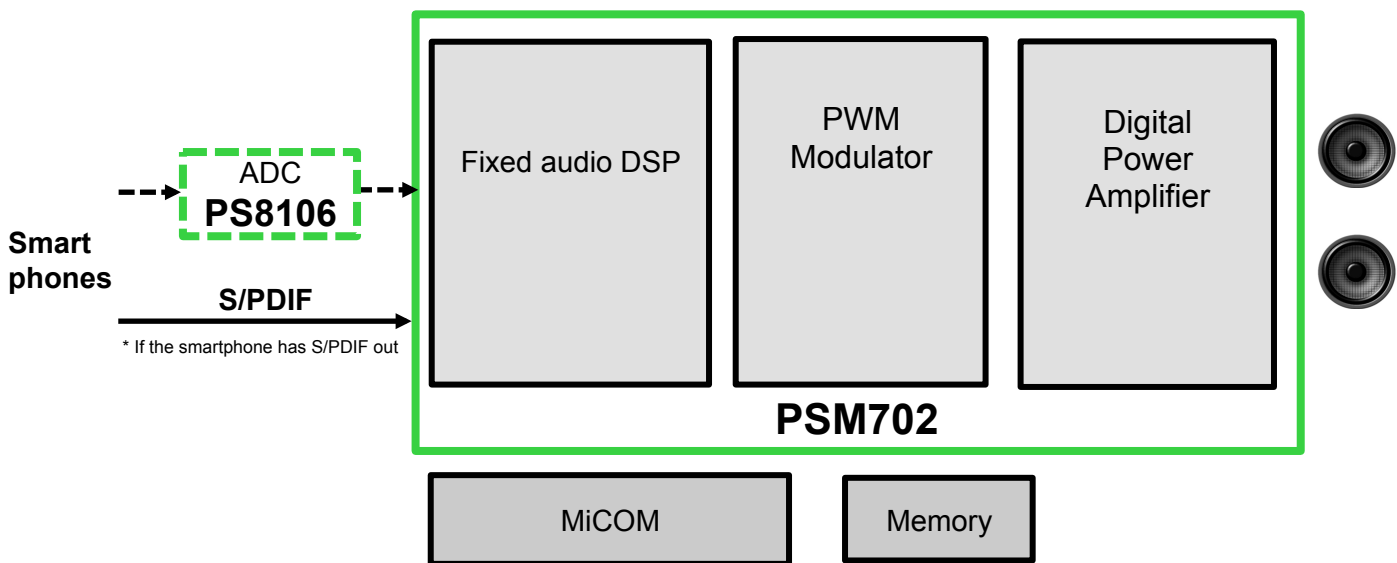
[System configuration of 5Wx2-ch (RMS) digital docking speaker]



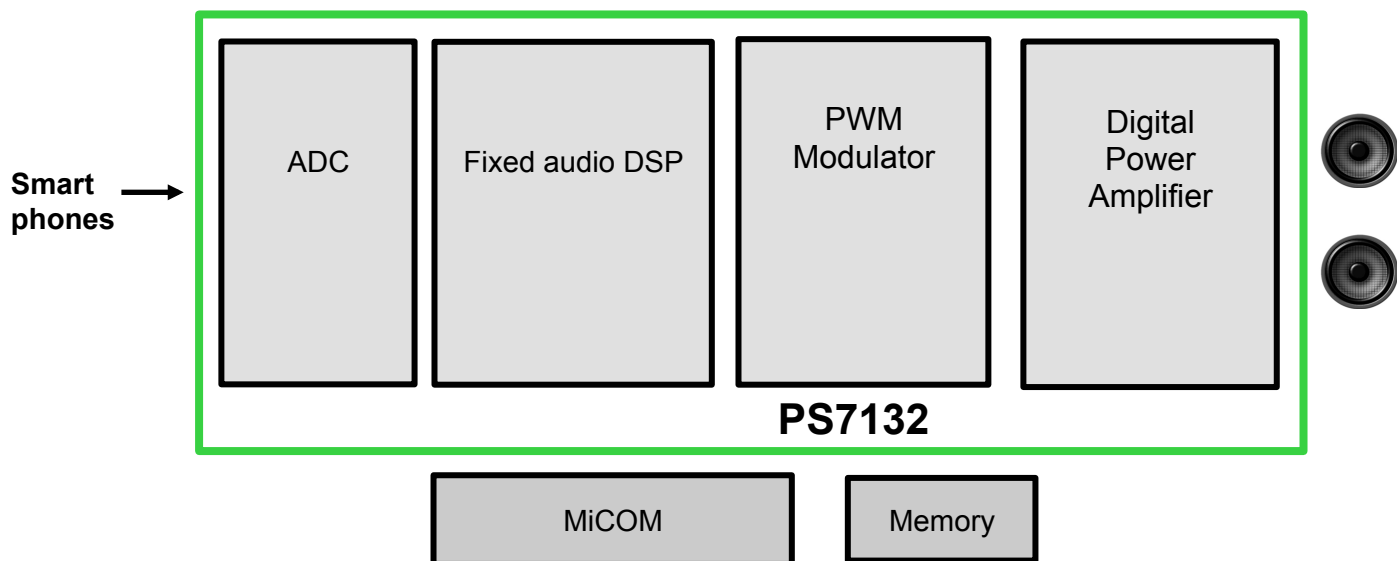
* Finished system module is available at Jan. 2011)

[System configuration of High-end digital docking speaker]

General Smartphone Speakers (Analog input)



[System configuration of AUX-input smartphone accessory speaker]



[System configuration of 5Wx-2-ch. AUX-input smartphone accessory speaker]

Hi-Fi full-digital audio CODEC

7131

Audio input: 2 x I²S input
 Dual sample rate converter for mixing
 Full-digital amplifier:
 - 1Wx2-channel RMS power
 - Headphone output
 On-chip fixed DSP
 7-band/ch equalizer, digital mixer, DRC,
 auto gain limiter, etc.
 Packages: WLCSP

702

Audio input: 2 x I²S input
 Full-digital amplifier:
 - 1Wx2-channel RMS power
 Headphone output
 On-chip DSP: SRC, 4-band/ch equalizer,
 Auto gain limiter
 Packages: QFN

High-power Digital Audio CODEC

7132

Coming soon

Audio input: 2 x I²S input, AUX
 Full-digital amplifier:
 - 5Wx2-channel RMS power
 - Headphone output
 On-chip fixed DSP

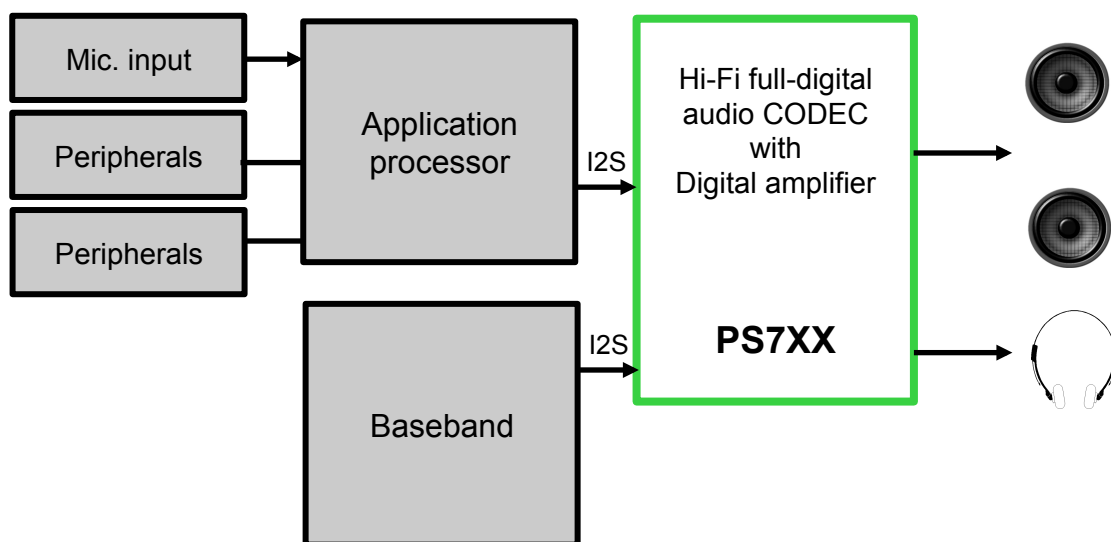
Audio ADC

8106

High-performance stereo ADC
 Three line-input/microphone input
 One I²S output
 Programmable gain amplifier

Advantages

Lossless Full-digital interface amplification
 : completely immune to any analog noise
 On-chip DSP: Superior sound quality and easy-tuning
 Loud sound by DigitalBoost
 High-efficiency (96%) and low-power consumption



[System configuration of audio part of Smartphones]

Smartphone / Portable Devices

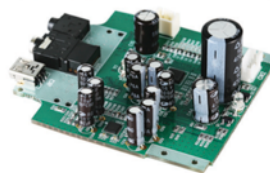
	7130	702	7131
Sample Rate Converter			
Input Sampling Rate	8kHz~48kHz	8kHz~48kHz	8kHz~48kHz
Input Sampling Rate Detection	O	O	O
Audio input			
# of Serial digital audio input (I2S)	2 x stereo	2 x stereo	2 x stereo
S/PDIF input	-	O	-
Communication interface			
I2C interface	O	O	O
On-chip DSP			
Digital volume control, mute	O	O	O
Digital volume boost	O	O	O
Bass boost	O	O	O
Equalizer	4 biquad	4 biquad x 2-channel	7 biquad x 2-channel
DRC	-	-	O
Bass/treble management	-	-	O
Digital mixer	-	-	O
DDC™ (Full-digital amplification controller)			
# of HD PWM channels	1 channel	2 channel	2 channel
Audio output			
Full-digital amplifier	1.6W mono (RMS) 3W mono (effective out)	1Wx2-ch (RMS) 2Wx2-ch (effective out)	1Wx2-ch (RMS) 2Wx2-ch (effective out)
Headphone out	-	O	O
Internal PLL	O	O	O
Internal LDO	-	-	O (For core and HP)
Package			
CSP	2.0mm x 2.0mm	-	2.5mm x 2.5mm
QFN	-	4mm x 4mm	-

2.0-ch. Computer speaker



PAM801

Audio input: USB
USB powered
Power output: 1Wx2-ch
Key input Buttons



PAM801B

Audio input: USB, AUX
USB powered
Power output: 1Wx2-ch
Key input Buttons



PAM802

Audio input: USB
USB/ Ext. 5V AC powered
Power output: 4.5Wx2-ch
Key input Buttons



PAM802B

Audio input: USB, AUX
USB/Ext. 5V AC powered
Power output: 4.5Wx2-ch
Key input Buttons



PAM803

Audio input: USB
Ext. 9V-12V AC powered
Power output: 15Wx2-ch
Key input Buttons



PAM803B

Audio input: USB, AUX
Ext. 9V-12V AC powered
Power output: 15Wx2-ch
Key input Buttons

2.1-ch. Soundbar with Digital docking



PAM510 (Coming soon)

Audio input:
- iPod/iPhone/iPad digital docking (USB)
- USB thumb drive
- AUX
- Optical
Power output: 15Wx2-ch + 30Wx1-ch
AC3 decoding
Key input Buttons + IR remote control