PurePath™ Wireless Audio

Texas Instruments

www.ti.com/purepathwireless

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PurePath™ Wireless

Uncompressed CD-quality wireless audio.

TI's PurePath™ Wireless audio products feature robust and high-quality 2.4 GHz devices for wireless digital audio streaming. The proprietary PurePath technology provides a solid wireless audio link and 16 bit / 44.1/48 KHz uncompressed audio with no unwanted noise or dropouts. It uses a number of RF channels dynamically chosen for lossless audio transmission, resulting in minimal interference with other RF devices in the 2.4 GHz band. With its built-in audio setup and HID interface, no software development is required. PurePath Wireless supports digital streaming for up to four audio channels and single-chip USB wireless audio products (CC8521 and CC8531) make the solution ideal for PC centric applications. The low and fixed programmable audio latency and distributed audio clock ensure perfect time synchronization between speakers. Combined with the easy-to-use configuration tool and application reference designs, TI's PurePath wireless audio solution ensures flexibility, cost-efficiency and a fast time-to-market.

Key features

- Single chip RF-IC solution dedicated to wireless audio
- Includes IC, RF protocol, application designs, built-in audio IC setup and HID interface
- 16-bit 44.1/48kHz audio link
- Multichannel streaming capabilities
- USB support. USB HID functions mapped to I/O pins.
- Free PurePath Wireless PC Configurator tool
- Built in intelligent audio protocol
- I2S and DSP/TDM interface support Codecs, ADCs, DACs, class-D amplifiers

Key benefits

- Uncompressed and lossless wireless stereo audio
- Enables streaming on up to four channels and to up to four devices
- Complete solution, no software development required
- Customizable solution, can optionally work with external MCU
- Data transfer possible in addition to wireless audio streaming
- Best-in-class coexistence with *Bluetooth*, WLAN or other 2.4 GHz devices

Application Areas

- Wireless headphones / headsets
- Wireless speaker systems
- Wireless signal cable replacement
- Wireless home theatre systems

CC85xx PurePath™ Wireless Audio family

The CC85xx PurePath Wireless system-on-chip (SoC) family provides robust, high quality, short-range 2.4 GHz wireless digital audio streaming in low-cost single chip solutions:

- CC8520 SoC supporting up to 2 audio channels
- CC8521 SoC supporting up to 2 audio channels and USB support
- CC8530 SoC supporting up to 4 audio channels
- CC8531 SoC supporting up to 4 audio channels and USB support

Flawless wireless sound.

Great care has been taken to ensure that the PurePath Wireless audio network provides gap-less and robust audio streaming in varied environments, and that it can coexist amicably with existing wireless technologies in the crowded 2.4 GHz ISM band. Most applications can be implemented without any software development and only require the CC85xx to be connected to an external audio source or sink (such as an audio codec, S/PDIF interface or class-D amplifier) and a few push buttons, switches or LED for human interaction. Advanced applications can interface a host processor or DSP directly to the CC85xx and directly stream audio and control most aspects of device and audio network operation.

The CC85xx have built-in wireless audio protocol with excellent robustness and coexistence through multiple techniques:

- Adaptive Frequency Hopping
- Forward Error Correction
- Buffering and Retransmission
- Error Concealment
- Optional high quality audio compression

High-quality wireless headphones & headsets

Production ready reference design

As part of the PurePath Wireless audio family, TI offers the market's most cost-effective reference design for high-quality headsets and headphones. The design enables 22 hours on 465mAh battery, which provides 100% longer battery life compared to today's standard headsets. The free reference design is available together with the CC85XXDK-HEADSET development kit which enables easy testing of complete headphone and headset functionality. The reference design consists of all-TI components, including BQ25015 power management device, the low-power TLV320AIC3204 audio codec and CC2590 range extender.

External system

- Seamless connection and control of selected TI audio codecs, DACs/ ADCs and digital audio amplifiers using I2S and I2C
- HID functions like power control, binding, volume control, audio channel selection can be mapped to I/Os
- RoHS compliant 6mm x 6mm QFN-40 package

RF section

- 5 Mbps over-the-air data rate
- Bandwidth-efficient modulation format
- Excellent link budget with program-mable output power up to+4 dBm and -83 dBm sensitivity
- Seamless support for CC2590 range extender for even wider RF coverage and improved robustness in difficult environments
- Suited for systems targeting compliance with worldwide radio frequency regulations: ETSI EN 300 328 and EN 300 440 class 2 (Europe), FCC CFR47 Part 15 (US) and ARIB STD-T66 (Japan)

Digital audio support

- CD-quality uncompressed audio (44.1/48KHz, 16 bits)
- Digital I2S audio interface supports 1-2 audio channels (CC852x) or 3-4 audio channels (CC853x) at sample rates of 32, 40.275, 44.1 and 48 kHz / 16 bit word-widths
- Audio latency is fixed and adjustable from less than 20ms
- Data side-channel allows data to be sent alongside the audio between external host controllers

PurePath™ Wireless application examples

The PurePath Wireless technology enables development of audio applications with multichannel and multipoint audio streaming capabilities, as well as out-of-the-box unwiring of headphones, headsets and speakers for consumer applications with USB support.

Headphones & Headsets

TI supplies complete reference designs for headphones and headsets. PurePath Wireless' multichannel and multipoint audio streaming capabilities enable

- Up to four headphones streaming two out of four audio mono channels.
- Up to four headphones receiving same stereo audio stream.
- Up to four headphones can dynamically change between stereo A (two audio channels) or stereo B (two audio channels)

Application areas

- Headphones
- Headsets

USB Headsets, Headphones and Speakers

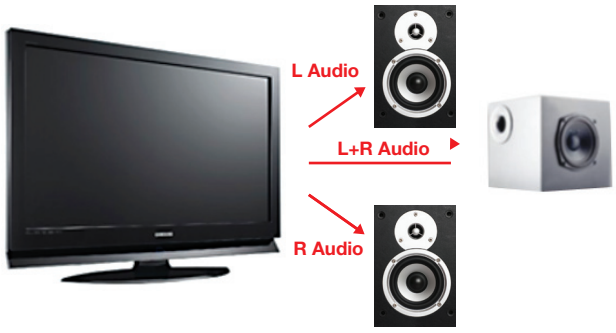
With single-chip USB wireless audio products (CC8521 and CC8531), PurePath Wireless provides USB audio support for Windows®, Linux®, Mac OS® X and Ubuntu® and enables out-of-the-box unwiring of headsets and speakers for PC, TV, gaming and set-top boxes. The solution enable streaming of up to four simultaneous audio channels from one source through one USB port. TI supplies complete reference design for USB dongles to complement PC headsets and speaker applications.

Application areas

- USB speaker systems
- USB headphones & gaming headsets
- USB headsets
- USB 2.1 speaker systems

Speaker Systems

PurePath Wireless' fixed programmable audio latency and distributed audio clock ensure perfect time synchronization between speakers. With the ability to stream two stereo streams from one audio source to several receivers, the CC8530 enables new use cases for wireless multichannel home audio applications:



Each device can selectively receive one or two of the transmitted audio streams. Example: 2.1 speaker system

Up to four devices streaming one out of four audio channels. Example: Multi-room system where two speaker sets play different stereo audio streams.

Application areas

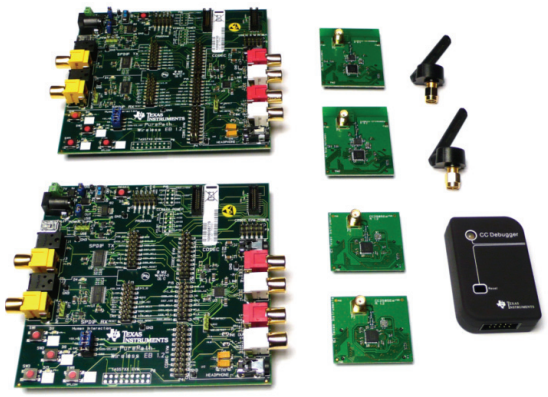
- 2.0 speaker systems
- 2.1 speaker systems
- 3.0 speaker systems
- 3.1 speaker systems

Getting started

PurePath™ Wireless development tools

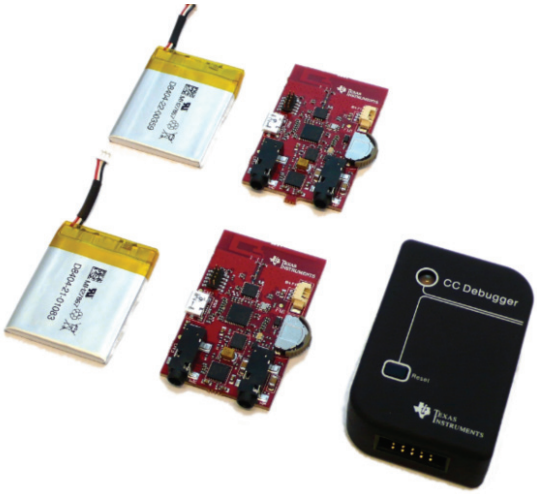
CC85xxDK

Start your wireless audio design with the CC85XXDK development kits. The kits let the users fully evaluate PurePath Wireless technology and the CC85xx for wireless audio applications. Audio interfaces available with the kit include S/PDIF optical + coax input/output, line input/output, headphone output and microphone input. A TLV320AIC3101 audio codec is mounted on the PurePath Wireless Audio Evaluation Board, which also has connectors compatible with other TI Codecs. CC85XXDK works with PurePath Wireless Configurator PC tool which helps designers configure and test PurePath Wireless audio devices.



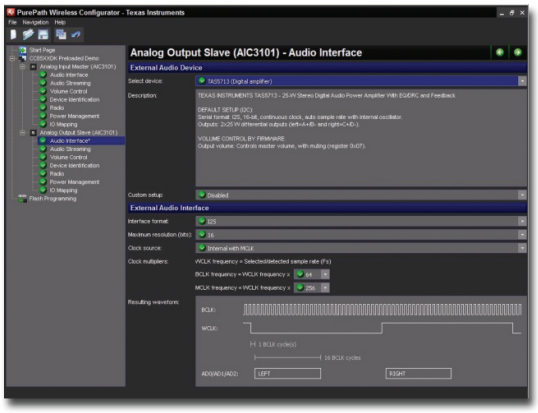
CC85XXDK-HEADSET

The CC85xxDK-HEADSET development kit and associated reference design provides a cost-effective design for high-quality headsets and headphones. The design achieves a 22-hour life on a 465 mAh battery – a 100 percent increase as compared to currently available headsets. The development kit enables easy testing of complete headphone and headset functionality. With all back-end work done by TI, developers can build a prototype in less than one day. The kit is fully programmable with PurePath Wireless Configurator PC tool.



PurePath Wireless Configurator

The PurePath Wireless Configurator (PPWC), a PC-based, graphical configuration tool, is used with the CC85xx to set up the desired functionality and parameters of the target system application. PPWC works on precompiled image files. Based on input from the user, PPWC will patch these to generate a downloadable firmware image. The designer can the CC85XX device directly in PPWC through the CC Debugger tool (included in CC85XXDK development kit) or output it to an Intel HEX-file (for production programming). No extra third party tool is needed for the development of PurePath Wireless-based application.



The PPWC can be downloaded for free at **www.ti.com/ppwc**

For more information on TI's wireless audio solutions and to order your PurePath Wireless development tools, please visit **www.ti.com/purepathwireless**

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