WT32i Bluetooth Audio Module
Topics

• Key Features
• Benefits
• WT32i Specifications
• iWRAP™ Bluetooth Software
• Certifications
• Development Tools
• Use Cases
Key Features

- **Bluetooth 3.0 compliant**
- **Integrated iWRAP™ Bluetooth Stack**
  - A2DP, AVRCP, HFP v.1.6, HSP, PBAP and MAP profiles for audio applications
  - SPP and iAP profiles for data
- **Excellent Radio Performance**
  - TX power: +6.5 dBm
  - RX sensitivity: -90 dBm
  - Link budget: 96.5 dB
- **Audio Features**
  - Integrated 16-bit stereo codec
  - Dual analog input/outputs
  - I2S and SPDIF digital interfaces
  - Microphone input with internal bias
  - SBC, mSBC, aptX and AAC software codecs
- **Host interfaces**
  - UART
- **Bluetooth, CE, FCC, IC, South-Korea and Japan qualified**
Benefits

- **Wide Bluetooth Profile Support**
  - Enables wide range of use cases and differentiation from regular Bluetooth speakers

- **Excellent Radio Performance**
  - Enables great user experience

- **Fully Integrated Bluetooth with Antenna, Radio and Software Stack**
  - Fast time to market
  - Low development risks

- **Flash based**
  - Firmware is field upgradable
  - Settings can be stored on the flash

- **Bluetooth, CE, FCC, IC, Japan and South Korea qualified**
  - Proven interoperability
  - Minimal qualification costs
WT32i Specifications

• **Bluetooth Radio**
  – *Bluetooth 3.0* compatible
  – Frequency: 2402 – 2480 MHz
  – TX power: +6.5 dBm
    RX sensitivity: -90 dBm

• **Antenna**
  – Integrated ceramic chip
  – U.FL connector

• **Line-of-Sight Range:**
  – Up to 200 meters
WT32i Specifications

- **Host Interfaces**
  - UART with hardware flow control
  - Up to 921kbps

- **USB**
  - Charging support

- **I2C**
  - Software I2C support
  - Can for example connect to Apple authentication chip or external audio codec

- **GPIO**
  - 10 software configurable GPIO pins

- **ADC**
  - 2 x 10-bit ADC

- **Led Driver**
  - Indicates battery charger status

- **Firmware Programming Interface**
WT32i Specifications

• **Differential Analog Audio Interfaces**
  – 16-bit
  – 95 dB SNR
  – Dual ADC upto 44.1 kHz
  – Dual DAC up to 48kHz
  – Microphone input with internal bias

• **Digital Audio Interfaces**
  – I2S
  – SPDIF

• **Integrated DSP**
  – SBC, aptX and AAC audio stereo codecs
  – CVSD and mSBC mono audio codecs
  – CVC echo cancellation

• **Integrated Battery Charger**
  – Tri-state charger
  – Support Li-Ion and Li-Poly up to 4.2V
  – Configurable charging current
WT32i Specifications

WT32i current consumption @ 3.3V

• TX Peak
  75 mA

• Idle Mode (Average)
  2.1 to 2.3 mA

• A2DP Streaming (Average)
  28 mA

• Deep Sleep:
  80 uA
WT32i vs. WT32

- **TX power**
  - WT32i: 6.5 dBm
  - WT32: 0 dBm

- **Flash Memory**
  - WT32i: 16Mbit
  - WT32: 8Mbit

- **Castellated Pads**
  - Exists on WT32 but not on WT32i

- **Antenna Connector**
  - WT32i: U.FL
  - WT32: W.FL

- **Firmware Support**
  - iWRAP6 and newer only supported by WT32i

- **Otherwise a drop-in replacement for WT32**
iWRAP™ Bluetooth Software
In it’s 5th generation at the moment
  – 6th generation under development
  – Used in multiple millions of products ranging from consumer electronics to medical and automotive applications

Bluetooth 3.0 compliant
  – Up to 7 simultaneous connections
  – 500+ kbps throughput over SPP

Implements 13 Bluetooth profiles
  – Audio: A2DP, AVRCP, HFP, HSP, PBAP and MAP
  – Data: SPP, iAP, OBEX, HID
  – Over-the-Air configuration and BGIO proprietary profiles

iWRAP API for external host processors
  – ASCII ”AT-like” commands over UART

Field Upgradable
  – DFU over UART support
iWRAP™ Software

- **iWRAP™ protocol**: A simple ASCII based (AT like) command, response and event protocol between the host and the stack
  - Used when a separate host (MCU) is used to control WT32i over UART
Apple iAP1 and iAP2 Profiles
- iWRAP6 adds iAP2, which is the latest version of iAP

AVRCP v.1.5
- Media browsing capability
- Media search capability
- Playlist management
- Push track and title information from AVRCP target to AVRCP source

AAC Audio Decoder
- iOS support AAC audio encoding
- AAC improves audio quality over SBC
- AAC needs a separate license: [http://www.vialicensing.com/licensing/aac-fees.aspx](http://www.vialicensing.com/licensing/aac-fees.aspx)

Message Access Profile (MAP)
- Message notifications support
- Downloading messages from a smart phone

iWRAP6 available only for WT32i late Q1/2014
Certifications

- **Bluetooth 3.0**
  - WT32i: Controller subsystem
  - iWRAP™: Host subsystem

- **CE**
  - EN300328
  - EN301489-1/17
  - EN60950-1

- **FCC**
  - Part 15C modular approval

- **Industry Canada**
  - IC modular certification

- **South Korea**
  - KCC certification

- **Japan**
  - ARIB-STD-66
Certifications: Migrating from WT32

- **Bluetooth**
  - EPL listing required according to the new Bluetooth SIG rules
  - $4000 or $8000 End Product Listing cost
  - Effective from 1st of February 2014

- **CE**
  - EN300328 needs to be re-measured, since the radio changes

- **FCC**
  - Minimum requirement is FCC label change with WT32i’s FCC ID
  - If the end product has its own FCC ID, it needs to be reapplied when WT32i used
  - If end product has multiple radios and it’s own FCC ID, it needs to be reapplied.
Development Tools

- WT32i Development Kit
  - WT32i-A Bluetooth Module
  - Li-Ion battery
  - 3.5mm and RCA audio input and output jacks for stereo and mono audio
  - Built-in SMD microphone
  - External I2S audio codec and Headphone Amp
  - USB and UART-to-USB interfaces
  - 5 buttons and leds
  - Programming interface
  - Current measurement point
  - I/O headers
  + Firmware programming tools
  + USB cable

- iWRAP Bluetooth Software
  - iWRAP™ API documentation
  - A2DP, AVRCP, HFP, PBAP etc. profile application notes
Availability

• General product release targeted late Q1/2014
  – iWRAP6 Bluetooth Software
  – Full certifications
  – Development kits available
  – High volume capability
Thank You