



# WT32i *Bluetooth* Audio Module

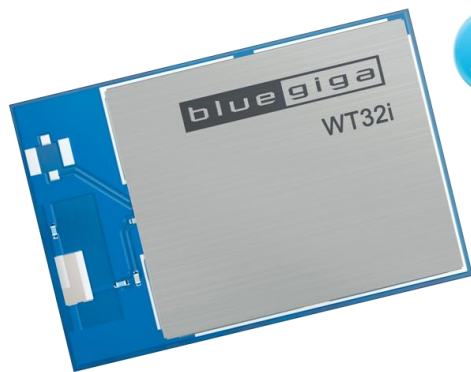


# Topics



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

# Key Features



- **Bluetooth 3.0 compliant**
- **Excellent Radio Performance**
  - Transmit power: +6.5 dBm
  - Receiver sensitivity: -90 dBm
  - Link budget: 96.5 dB
- **Audio Features**
  - Integrated DSP
  - 16-bit stereo codec
  - 44.1kHz ADC, 48kHz DAC
  - Analog, I2S, PCM, SPDIF, and microphone interfaces
  - Optional aptX® and AAC stereo audio codecs
  - Optional CVC® echo cancellation
  - Wide Band Speech
- **Built-in Battery Charger**
- **Operating Voltage:** 1.8V to 3.6V
- **Temperature Range:** -40C to +85C
- **Bluetooth, CE, FCC, IC, Korea and Japan Qualified**
- **Integrated iWRAP6 Bluetooth Stack**
  - 13 Bluetooth profiles
  - Apple iAP1 and iAP2 compatibility

# Benefits



- **Excellent Radio Performance**
  - up to 200 meter range (between two WT32i's)
  - A2DP streaming up to 50 meters with typical smartphone
- **Wide *Bluetooth* Profile Support**
  - Enables wide range of uses cases
  - Differentiation from simple *Bluetooth* speakers
- **Superior audio features**
  - Integrated *Bluetooth* audio profiles
  - On-board DSP and 16-bit stereo codec
  - aptX®, AAC and WBS
  - Optional CVC® echo cancellation
- ***Bluetooth* and Regulatory Qualifications**
  - Proven interoperability
  - Minimal qualification costs
- **Field upgradable firmware**

# 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 and optional aptX and AAC audio software codecs
  - CVSD and mSBC mono audio software codecs
  - Optional 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  $\mu$ A



# 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
- **Temperature Range**

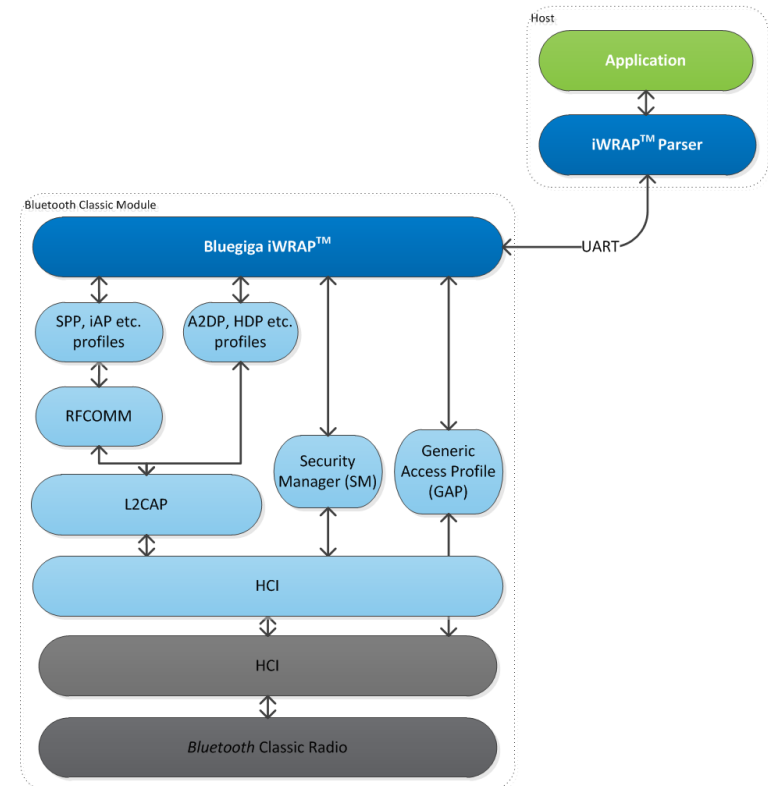
WT32i	-40C to +85C
WT32	-30C to +85C
- **Firmware Support**

iWRAP6 and newer only supported by WT32i
- **Otherwise a drop-in replacement for WT32**

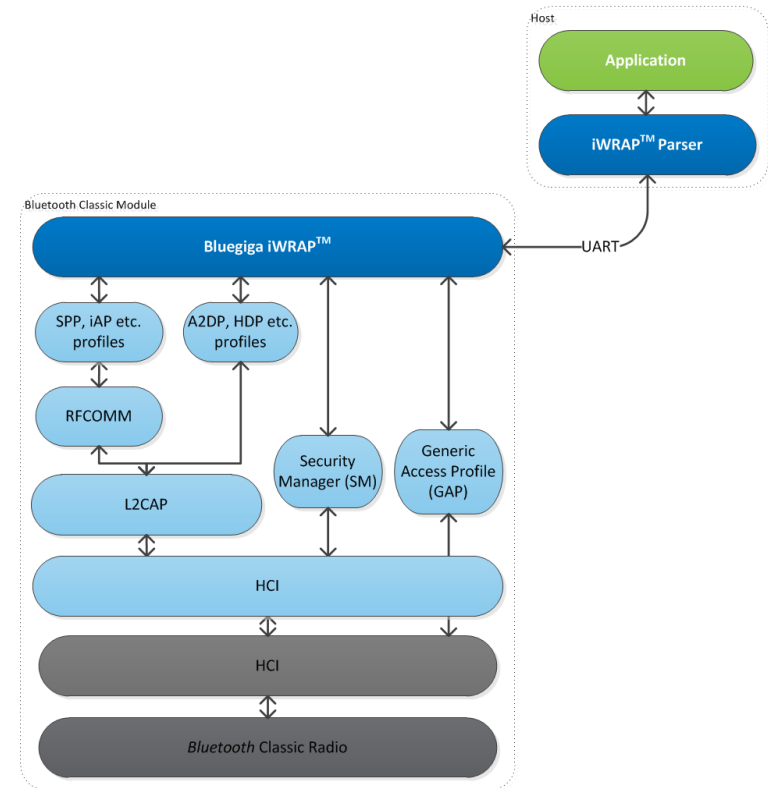


# iWRAP™ *Bluetooth* Software

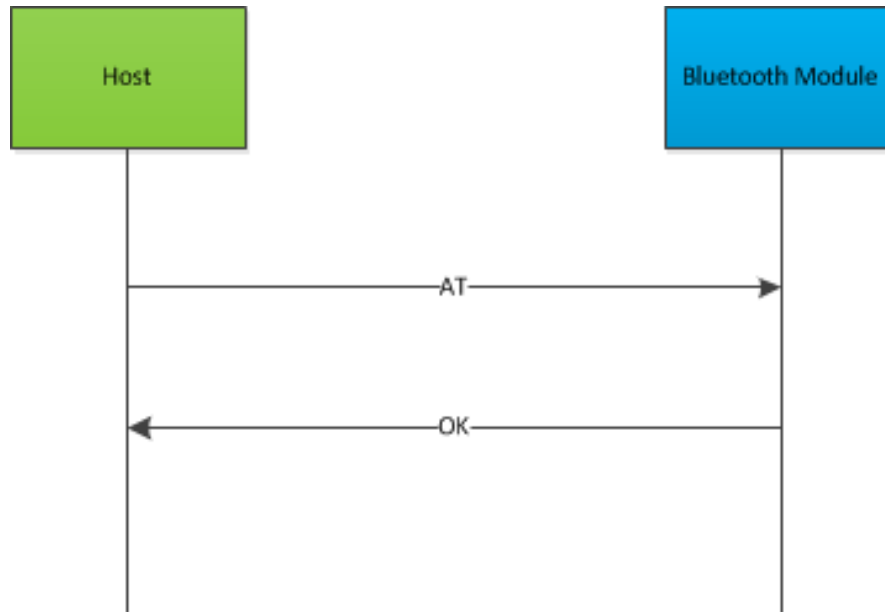
- **Bluetooth 3.0 compliant**
  - Up to 7 simultaneous connections
  - 500+ kbps throughput over SPP
- **Implements 13 Bluetooth profiles**
  - **Audio:** A2DP, AVRCP v.1.5, HFP v1.6, HSP, PBAP and MAP
  - **Data:** SPP, OBEX and HID
- **iWRAP API for external host processors**
  - ASCII "AT-like" commands over UART
- **Apple iAP1 and iAP2 Profiles**
  - Provides application connectivity to Apple iOS devices
- **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>
- **Field Upgradable**
  - DFU over UART support



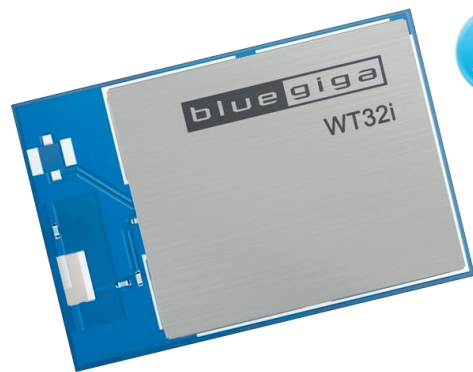
- **Apple iAP1 and iAP2 Profiles**
  - Provides application connectivity to Apple iOS devices
- **AVRCP v.1.5**
  - Enables media browsing on a smart phone
  - Media search capability
  - Playlist management
- **Message Access Profile (MAP)**
  - Receive message notifications from the phone
  - Read SMS messages over *Bluetooth*
- **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>
- **External codec configuration over I2C**
  - iWRAP can configure external audio codec over I2C interface



- **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



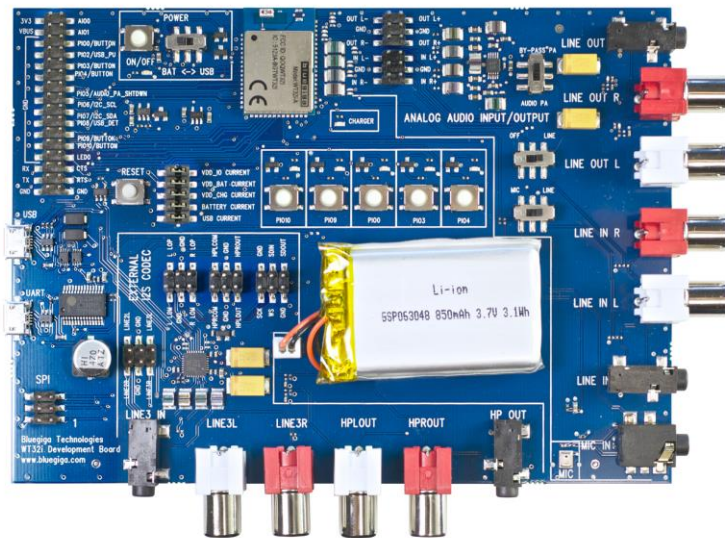
# Certifications



- **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



# 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 Amplifier
  - USB and UART-to-USB interfaces
  - 5 buttons and leds
  - Programming interface
  - Current measurement point
  - I/O headers
  - I2C extension connector
  - + Firmware programming tools
  - + USB cable
- **iWRAP6 Bluetooth Software**
  - iWRAP™ API documentation
  - A2DP, AVRCP, HFP, PBAP etc. profile application notes
  - iAP example application for iOS



Thank You

