bluegiga

Bluegiga eHealth Product Guide

3 Nov, 2010

Table of Contents

Global Technology Leader in *Bluetooth* Connectivity Platforms

Founded in 2000, Bluegiga Technologies Inc. provides *Bluetooth* based wireless modules and access device solutions to OEMs, systems integrators and network operators. Bluegiga has built its reputation on providing innovative products and outstanding customer service at competitive prices to our customers in health and medical, automotive, audio, industrial, and consumer markets. Headquartered in Espoo, Finland, Bluegiga has offices in the US and Hong Kong and serves customers in more than 65 countries.

Contact us sales@bluegiga.com and learn more about how we can help you solve your *Bluetooth* application needs.

Complete Solution Approach

Bluegiga's flexible, highly integrated products meet the most demanding requirements and can be used in a limitless number of applications. Our products are engineered to last and have the best in class RF sensitivity and power consumption profiles. Bluegiga's simple, but powerful software interface makes application development and integration straightforward for the seasoned developer or the novice engineer. To ensure a successful customer project Bluegiga provides its customers robust technical information and a highly skilled customer service team to assist with any application scenario.

Our complete solution approach is designed to help our customers shorten development cycles, reduce design uncertainty, and improve time to market when creating *Bluetooth* enabled solutions.

Bluegiga eHealth *Bluetooth* Gateways

Bluegiga's eHealth *Bluetooth* Gateway product family offers simple and efficient network connectivity for *Bluetooth* enabled medical, health and fitness devices. Built on a Linux™ operating system platform, our gateway devices offer flexible operating modes for data routing, application hosting, and protocol conversation.

Our eHealth gateway devices incorporate Bluegiga's latest generation long range *Bluetooth* module increasing range three or four times when compared to other competing *Bluetooth* gateways. This makes the Bluegiga *Bluetooth* eHealth Gateway an ideal solution for in-home, clinic, or hospital environments.

For maximum flexibility and application customization, Bluegiga offers an eHealth Gateway SDK . The eHealth Gateway SDK provides example applications source code and other development tools for software developers to extend gateway functionality to fit their unique application and back end system requirements.

The eHealth *Bluetooth* Gateways are available in several product variants that combine multiple *Bluetooth* radios with 2G/3G, Wi-Fi and ethernet connectivity in a single, integrated platform. They are capable of supporting from 7 to 21 simultaneous *Bluetooth* connections making them an ideal solution for networking multiple medical or health and fitness devices to back end systems. To learn more about our eHealth *Bluetooth* Gateways please go to page 10.

Bluegiga eHealth *Bluetooth* Modules

Bluegiga eHealth *Bluetooth* Modules™ are engineered to support virtually any health, medical or fitness application requirement where *Bluetooth* wireless technology is needed for data or audio communications. Bluegiga's OEM modules family incorporates our eHealth *Bluetooth* protocol stack and carefully designed hardware and antenna solution, simplifying customer integration project while providing the maximum connection distance. Bluegiga eHealth *Bluetooth* module integrates the *Bluetooth* Health Device Profile and IEEE agents/managers into a simple-to-use and Continua and *Bluetooth* certified offering. It also enables OEMs to deploy the modules safely and effectively into Telehealth (telemedicine), mHealth or fitness applications.

Hundreds of medical OEMs worldwide rely on Bluegiga's *Bluetooth* OEM modules for the most demanding wireless applications. Bluegiga's experience in engineering *Bluetooth* wireless technology devices exceeds 200 man-years resulting in high quality, robust and exceptionally reliable *Bluetooth* devices.

To read more about our industry leading *Bluetooth* modules go to page 18.

"Equipment manufacturers and system integrators are often faced with the non-trivial challenge of integrating radio frequency technologies into their own products. These integration projects always need to be completed within the budget and under tight schedules to beat the market competition while still maintaining high product quality, excellent performance, and unmatched user experience. Bluegiga provides the best type of radio technology and world-class integration support to ensure customer needs and exceed project targets."

Petri Salonen, CEO, Bluegiga Technologies Inc.

Bluegiga Customer Service Team

Even though *Bluetooth* technology is widely used, it can be challenging for even the most seasoned engineer to implement a consistent, secure, and reliable connection. Bluegiga's customer service team is well trained, experienced and willing to help our customers solve their application challenges. By partnering with Bluegiga on your application you will have full access to our support specialists who are eager to help you create a winning wireless solution.

Bluegiga customer service team is an experienced global team knowledgeable in all facets of Bluegiga's products and *Bluetooth* technology having supported thousands of customers throughout the world. With this kind of product knowledge and experience you can be assured that we will be able to help you get to market with a working *Bluetooth* solution.

Bluegiga Customer Service Offering

● Online Self-service – techforum.bluegiga.com

Techforum.bluegiga.com is an online self-service resource that offers the latest product information: datasheets, software/firmware updates, design references, manuals, and application notes. Please visit techforum.bluegiga.com and register your personal support account today.

● Support@bluegiga.com - Answer in 1 Business Day

Support@bluegiga.com is a structured ticket tracking system where all inbound questions are logged, monitored, and replied to by our customer service team. When you email support@bluegiga.com your question will be issued a ticket number for future tracking and communications. Our support staff will then analyze your question and provide recommended steps to solve your specific application needs. If you would like to talk with our support experts over the phone please call your local support contacts or request a call by emailing to support@bluegiga.com.

● Design Review

Once you have selected Bluegiga for your application we want to ensure your project's success. We offer design review services through support@bluegiga.com. Our customer service team will evaluate your design and suggest changes that are needed to ensure the highest quality end product with minimal fine-tuning and effort.

● System Testing Services

Sometimes even with the most careful design you may find that you still need to improve your product's *Bluetooth* functionality to meet your customer's expectations. Bluegiga can assist you by measuring your product's operating characteristics, identify potential issues, and suggest improvements to create the best possible solution for your customer. Please contact your sales representative to learn more about our testing services.

Bluetooth Low Energy

Imagine millions of people with tiny wireless sensors attached to their bodies, monitoring heart rate, blood pressure or location while being connected to Internet . This has never been closer in becoming a reality than today. *Bluetooth* low energy technology is the hallmark feature of *Bluetooth* specification v.4.0 and it holds the promise of low energy connectivity – everywhere, into anything.

Bluetooth low energy is a new, open standard developed by the *Bluetooth* SIG. It's targeted to address the needs of new modern wireless applications, such as ultra low power consumption, fast connection times, reliability and security. *Bluetooth* low energy consumes 10-20 less power and is able to transmit data 50 times quicker than classical *Bluetooth* solutions.

Bluetooth low energy is designed for new emerging applications and markets, such as: health and fitness, consumer medical, smart energy, industrial automation and security, but it still embraces the very same

features we already know from the classical, well established *Bluetooth* technology.

Robustness and Reliability

The adaptive frequency hopping technology used by *Bluetooth* low energy allows the device to quickly hop into a wide frequency band. It not only reduces interference, but also identifies crowded frequencies and avoids them. In addition to broadcasting, *Bluetooth* low energy provides a reliable and connection oriented way of transmitting data.

Security

Data privacy and integrity are always a concern in wireless, mission critical applications. Therefore, *Bluetooth* low energy technology is designed to incorporate high level security including authentication, authorization, encryption and man-in-the-middle protection.

Interoperability

Bluetooth low energy technology is an open standard maintained and developed by the *Bluetooth* SIG. Strong qualification and interoperability testing processes are included in the development of technology so that wireless device manufacturers can enjoy the benefits of many solution providers and consumers can feel confident that their equipment can communicate with other devices regardless of the manufacturer.

Global Availability

Based on the open, license free 2.4GHz frequency band, *Bluetooth* low energy technology can be used in worldwide applications.

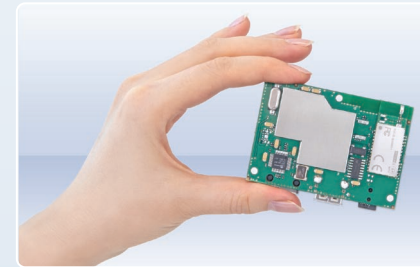*Bluetooth* low energy devices come in two types:

- Single-mode devices that only support *Bluetooth* low energy, and are optimized for low-power, low-cost and small-size solutions.

- Dual-mode devices that support *Bluetooth* low energy and classical *Bluetooth* technologies, and are interoperable with all previous *Bluetooth* specification versions.

Bluegiga is committed to being one of the first companies to introduce *Bluetooth* low energy solutions by releasing single mode products in 2010 and dual-mode products in 2011.

Access Point 3201™

Key Features

▷ The smallest *Bluetooth* Access Point in the industry

▷ Embedded Linux™ Operating System

▷ Turn-key applications for *Bluetooth* networking and *Bluetooth* proximity marketing

▷ *Bluetooth* class 1, 2.0/2.1 + EDR compliant

▷ Supported *Bluetooth* profiles: SPP, OBEX OPP, OBEX, FTP, PAN, LAN Access, DUN-GW, DI, HDP

▷ *Bluetooth* , CE, Fec and Industry Canada qualified

▷ External and internal antenna options

▷ Adjustable connection range between 1-200 meters

Applications

▷ Connectivity

▷ eHealth

▷ Point of sales

▷ Proximity marketing

▷ Digital Pen

Description

Bluegiga's Access Point 3201 is a small and cost optimized access device targeted at business applications. The product is designed to fit into wireless *Bluetooth* applications where the network performance, reliability, scalability and easy management are important design drivers.

The Access Point is equipped with Bluegiga's industry leading 2.1 + EDR compliant WT11 *Bluetooth* module providing users with the features and benefits of the very latest *Bluetooth* standard. The product also has an external USB connector for extending the product capabilities with GPRS/3G USB modems, Wi-Fi or extra memory.

The Access Point is an evolution from Bluegiga's extremely reliable and successful Access Server product family. The product's software and user interface makes it compatible with Bluegiga Access Servers. Access Point 3201 can be remotely managed with Bluegiga Solution Manager (BSM) - enabling remote management of a number of Access Points from a centralized location.

The heart of Access Point 3201 is Bluegiga's customized Linux operating system with a number of built-in applications, such as SPP-over-IP and ObexSender. For *Bluetooth* wireless technology, The product has extremely advanced, reliable and easy-to-use software interface called iWRAP, which enables you to connect your *Bluetooth* equipped devices into TCP/IP networks with built-in security and reliability. Access Point 3201 is also available for OEM's without the housing providing total freedom of re-branding.

Long Range *Bluetooth* Access Point 3241™

Key Features

▷ Significant *Bluetooth* radio performance
- +20 dBm transmit power
- −90dBm receiver sensitivity

▷ Maximum line-of-sight range 1000m

▷ *Bluetooth* 2.1 + EDR compliant

▷ 10/100Mbps Ethernet interface

▷ USB host port for optional accessories

▷ Built-in application interfaces for medical, *Bluetooth* marketing and TCP/IP networking

▷ Centralized remote management system with Bluegiga Solution Manager™

▷ Supported *Bluetooth* profiles: SPP, OBEX OPP, OBEX FTP, PAN, LAN Access, DI and HDP

▷ Embedded Linux™ operating system

▷ Software development kit

Applications

▷ Connectivity

▷ eHealth

▷ Point of sales

▷ Proximity marketing

▷ Digital Pen

▷ M2M

Description

The Long Range *Bluetooth* Access Point 3241 (AP3241) is the ideal solution for demanding connectivity applications, where extreme performance and robustness is needed. AP3241 is ideal for applications where different *Bluetooth* devices need to be wirelessly connected to the Internet. These applications include medical, point-of-sale, proximity marketing, location tracking, digital pen and generic *Bluetooth* networking.
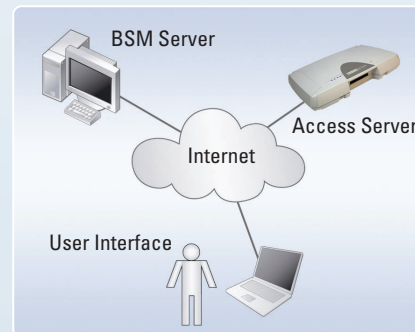
The *Bluetooth* radio performance is taken to the extreme and AP3241 can reach line-of-sight range up to 1000 meters. With typical class 2 *Bluetooth* devices, the improved sensitivity increases the range up to 80 meters – meaning 3-4 times more range than normally. The built-in USB port allows the use of optional accessories, such as Wi-Fi, 3G modems or extra memory.

The AP3241 has built-in applications for use in e.g. eHealth and it offers the standardized *Bluetooth* Health Device Profile and Continua based IEEE 11073-20601 manager. The data can be relayed to various back-end services such as Google Health. AP3241 is also ideal for *Bluetooth* proximity marketing applications, because the improved range offers extended coverage and more reliable file delivery. The built-in proximity marketing software enables almost all turn-key solutions.

Bluegiga Solution Manager™

Bluegiga Solution Manager (BSM) is a web-based remote management and monitoring platform for Bluegiga Access Servers. By using BSM, you can simultaneously upgrade, monitor and configure a large number of Bluegiga Access Servers, instead of configuring each device one-by-one.

Key Features

▷ Provides remote management of Bluegiga *Bluetooth* Access Server groups

▷ Enables managing the *Bluetooth* marketing applications (ObexSender)

▷ Simple graphical user interface

▷ Can be used over LAN, GPRS, or any other Internet connection type

▷ Communicates by using secure, encrypted network protocols

▷ Enables remote upgrades of Bluegiga *Bluetooth* Access Server software and content

▷ Available APIs enable complete look and feel customization

▷ User permissions can be tailored to provide different levels of user accounts

Description

Bluegiga Solution Manager makes it possible to manage deployments of Bluegiga *Bluetooth* Access Servers from a single point by a heterogeneous group of administrators and users. BSM also enables content management for the Bluegiga ObexSender application - targeted for *Bluetooth* marketing solutions.

BSM is designed for companies looking for a ready-made management tool, and companies that need a customizable platform for tailoring the user interfaces and re-branding the system. BSM is available as a hosted service or as a CD-ROM delivery for customers that install the system on their own server hardware. In addition, the price of the system is reasonable.

eHealth Gateway SDK™

eHealth Gateway SDK is a powerful software development environment that enables the development of complete health applications for Bluegiga eHealth *Bluetooth* Gateway platform. The eHealth Gateway SDK is bundled with Code::Blocks Integrated Application Development environment for C and C++ programming languages, standard Linux APIs and Bluegiga's APIs for *Bluetooth* wireless technology and IEEE 11073-20601. In addition, the SDK comes with sample projects and applications for interfacing back end servers such as, Google Health.

The eHealth Gateway SDK enables software developers to write user programs for specific applications on top of proven and qualified *Bluetooth* software and Continua compliant IEEE manager stacks and run them on any available Bluegiga's *Bluetooth* eHealth gateways. With the SDK the developer's only need to write the user program and do not need to do complex and time consuming *Bluetooth* wireless technology or IEEE 11073-20601 development since they have already implemented and have flexible Application Programming Interfaces. This is designed to allow development, testing and certification times to be shorter and enable very quick time to market.

Bluegiga *Bluetooth* eHealth Gateway platform and eHealth Gateway SDK is the only combined solution in the market allowing fast development of *Bluetooth* wireless technology and Continua compliant health and medical applications.

Key Features

▷ A fully functional C and C++ Integrated Development Environment based on the Code::Blocks platform

▷ Supports standard IDE features such as:
  - Project creation and managed build for various tool chains
  - Standard make build
  - Source navigation
  - Debugging tools

▷ Standard C/C++ Linux APIs:
  - File access
  - TCP/IP
  - HTTP/HTTPS
  - XML
  - D-BUS etc.

▷ Bluegiga's proprietary APIs:
  - *Bluetooth* D-BUS API
  - IEEE 11073-20601 D-BUS API
  - Google Health CCR

▷ Example applications and Code:: Blocks- projects
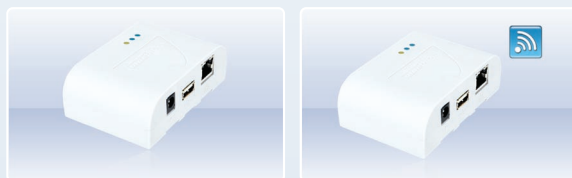
Features	AP3201	AP3241
Bluetooth specification	2.0/2.1 + EDR	2.1 + EDR
Bluetooth class	1 (Configurable for Class 2)	1
Range, line of sight	200m	1000m
Number of connections	Up to 7	Up to 7
Antenna	Internal or external	Internal
Temperature range	0° to +60°	0° to +60°
Maximum throughput	2,1Mbps	2,1Mbps
Integration	Housed or OEM in PCB form	Housed or OEM in PCB form
Interfaces	ETH, USB	Ethernet, USB host
DC input	9-24 VDC	9-24 VDC
AFH supported	Yes	Yes
Network management	BSM, web interface, SSH	BSM, web interface, SSH
Memory*)	32MB RAM, 16MB Flash	32MB RAM, 16MB Flash
Bluetooth module	Bluegiga WT11-A/E	Bluegiga WT41
Certifications	*Bluetooth*, CE, FCC and IC	*Bluetooth, CE, FCC, IC and Telec*
Ability to host applications	Yes	Yes
Operating system	Linux	Linux
Weight	74 g	74 g
Size	90x59x30mm	90x59x30mm
Profiles	SPP, OBEX OPP, OBEX FTP, PAN, LAN Access, DI, HDP	SPP, OBEX OPP and FTP, PAN, LAN Access, DI and HDP

*) Extendable to GBs

Bluegiga Solution Manager (BSM)

Bluegiga Solution Manager (BSM) is a web-based remote management and monitoring platform for Bluegiga Access Servers. By using BSM, you can simultaneously upgrade, monitor and configure a large number of Bluegiga Access Servers, instead of configuring each device one-by-one.

▷ Provides remote management of Bluegiga Access Servers

▷ Enables managing the *Bluetooth* marketing applications (ObexSender)

▷ Simple graphical user interface

▷ Can be used over LAN, GPRS, or any other Internet connection type

▷ Communicates by using secure, encrypted network protocols

▷ Works seamlessly through firewalls

▷ Enables remote upgrades of Bluegiga Access Server software and content

▷ Available APIs enable complete look and feel customization

▷ User permissions can be tailored to provide different levels of user accounts

Bluegiga *Bluetooth*® Modules

iWRAP™ *Bluetooth* Stack

iWRAP™ is an embedded *Bluetooth* stack firmware for Bluegiga's *Bluetooth* modules. It exposes a powerful yet easy-to-use command interface to manage *Bluetooth* operations. iWRAP hides the complexity of *Bluetooth* protocol stack and profiles from the end user. A multitude of different *Bluetooth* profiles are supported that are suitable for a wide variety of applications. iWRAP can be used for almost anything from simple data or audio applications to more complex use cases.

Key Features

The latest iWRAP4™ firmware version offers the following *Bluetooth* profiles and features embedded into the module:

▷ HDP with IEEE Agents

▷ HDP with IEEE Manager

▷ Advanced Audio Distribution Profile (A2DP) : Sink and source modes

▷ A/V Remote Control Profile (AVRCP) : AVRCP controller and target

▷ Device Identification Profile (DI)

▷ Serial Port Profile (SPP) : DevA/ DevB

▷ Hands-Free Profile (HFP) v.1.5 : HPF and HFP-AG modes

▷ Headset profile v.1.2 (HSP) : HSP and HSP-AG modes

▷ Dial-up Networking Profile (DUN) : Terminal emulation

▷ Object Push Profile (OPP) : OPP server and client

▷ Human Interface Device (HID) : HID device

▷ Bluegiga proprietary IO Profile (BGIO)

▷ Bluegiga proprietary OTA (Over-the-Air configuration profile)

▷ Phone Book Access Profile (PBAP) : PBAP client
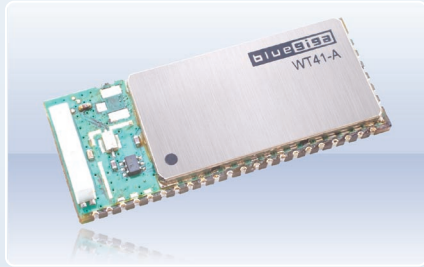
▷ File Transfer Profile (FTP) : FTP client
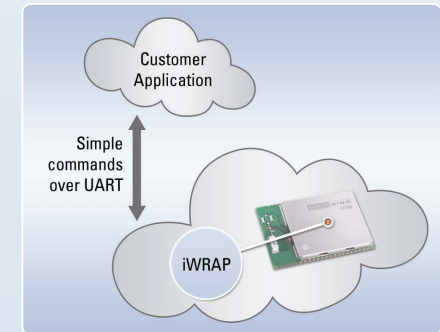
▷ *Bluetooth* Health Device Profile (HDP) : Sink and source modes

▷ Secure Simple Pairing (SSP)

Benefits

▷ A simple interface to exploit the power of Bluetooth wireless technology

▷ UART interface for iWRAP enables integration to almost any product

▷ iWRAP runs inside the module, no need to run Bluetooth stack on the host system

▷ Easy to understand commands and responses

▷ A wide variety of *Bluetooth* profiles to make complex use cases possible

▷ All profiles are *Bluetooth* qualified

▷ Easy to customise by Bluegiga Technologies

WT41 Long Range *Bluetooth* Module™

Key Features

▷ *Bluetooth* 2.1+ EDR

▷ Integrates a *Bluetooth* radio, *Bluetooth* stack and profiles

▷ Exceptional radio performance
  - Transmit power : +20dBm
  - Receiver sensitivity: -90dBm

▷ Available with high efficiency chip antenna

▷ Industrial temperature range -40°C to +85°C

▷ Supported *Bluetooth* profiles: SPP, DUN, HFP, HSP, HID, AVRCP, DI, PBAP, OPP, FTP and HDP

▷ Standard HCI over UART or USB

▷ *Bluetooth* end product, CE, FCC, IC, TELEC, MK qualified

Description

WT41 is truly a long range *Bluetooth* module that offers an impressive 1000 meters range between two WT41 *Bluetooth* modules. The module utilizes Bluegiga's sophisticated radio frequency design methodologies and offers OEM's a trouble free product even with tight integration with surrounding electronics.

WT41 comes with Bluegiga's iWRAP firmware offering the users a simple software integration without the need of *Bluetooth* protocol or profile development. iWRAP is an embedded *Bluetooth* stack firmware for Bluegiga's *Bluetooth*. It exposes a powerful but easy-to-use command interface to manage *Bluetooth* operations. iWRAP hides the complexity of *Bluetooth* protocol stack and profiles from the end user.

WT21 *Bluetooth* Module™

Key Features

▷ Highly integrated and cost efficient *Bluetooth* HCI module

▷ *Bluetooth* Class 1 radio based on CSR's BlueCore-6

▷ Embedded antenna

▷ *Bluetooth* 2.1 + EDR compliant

▷ *Bluetooth* Controller subsystem CE, FCC and IC qualified

▷ Extended temperature range from -40 ºC to +85 ºC

▷ 801.11 co-existence interface

▷ AuriStream baseband codec, which provides better audio quality

▷ Supports any *Bluetooth* stack with HCI interface

Description

WT21 is intendend for *Bluetooth* applications where a host processor is capable of running the *Bluetooth* software stack. WT21 only implements the low level *Bluetooth* Host Controller Interface (HCI) but still offers advantages of a module - easy implementation and certifications. As based on CSR's BlueCore-6 chip, WT21 offers the lowest current consumption and the highest integration level in its class. WT21 is also fully ready to support the latest *Bluetooth* 2.1 standard.

WT21 also has CSR's AuriStream technology built in, which significantly improves the quality of voice in audio applications.

WT21 supports any *Bluetooth* software stack that implements the standard *Bluetooth* HCI interface. The software stack can interface to the module either via UART, SDIO or SPI interface.
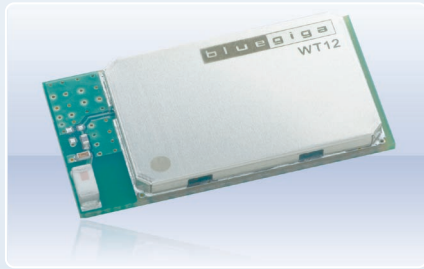
WT21 offers *Bluetooth* in integrated form factor that is easy to understand, manage and source. It is an ideal product for an OEM who does not want to spend significant amount of time and money to RF regulatory approvals and designing a complex 2,4 GHz radio product.

By utilizing Bluegiga's world-class integration services and technical support, OEMs can be assured that their products reach the market quickly and cost efficiently.

WT12 *Bluetooth* Module™

Key Features

▷ *Bluetooth* Class 2

▷ Integrated chip antenna

▷ Enhanced Data Rates (EDR) with data throughput up to 2-3Mbps

▷ Support for Adaptive Frequency Hopping (AFH) and 802.11 co-existence

▷ USB version 2.0

▷ UART with bypass mode

▷ 8Mbits of flash memory

▷ Supported *Bluetooth* profiles: HDP, SPP, DUN, OBEX OPP, HFP v.1.5, DID, HID + HCI

▷ Industrial temperature range from -40°C to +85°C

▷ RoHS compliant

▷ Pin-to-pin compatible with WT11 module

▷ Simple iWRAP™ firmware for controlling *Bluetooth* wireless technology

▷ Fully qualified end product with *Bluetooth* 2.1 + EDR, CE and FCC

Description

WT12 is a next-generation, class 2, *Bluetooth* 2.1 + EDR module. It introduces three times faster data rates compared to the existing *Bluetooth* 1.2 modules even with a lower power consumption. WT12 is a highly integrated and sophisticated *Bluetooth* module, containing all the necessary elements from *Bluetooth* radio antenna to a fully implemented protocol stack. Therefore WT12 provides an ideal solution for developers who want to integrate *Bluetooth* wireless technology into their designs with limited knowledge of *Bluetooth* and RF technologies.
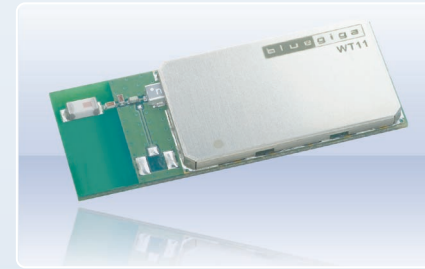
WT12 module combined with Bluegiga's complete development, testing and verification services and excellent developer support, OEMs and designers ensure that their products reach the market rapidly and cost-efficiently in relation to time and resources. Bluegiga has extensive in-house knowledge of both software and hardware offering customers a single point of contact to all *Bluetooth* related issues.

By default WT12 module is equipped with powerful and easy-to-use iWRAP firmware. iWRAP enables users to access *Bluetooth* functionality with simple ASCII commands delivered to the module over serial interface. Entering the world of *Bluetooth* wireless technology could not be easier!

WT11 *Bluetooth* Module™

Key Features

▷ *Bluetooth* Class 1

▷ Two antenna options: integrated chip antenna or U.FL connector

▷ Enhanced Data Rates (EDR) with data throughput up to 2-3Mbps

▷ Support for Adaptive Frequency Hopping (AFH) and 802.11 co-existence

▷ USB version 2.0

▷ UART with bypass mode

▷ 8Mbits of flash memory

▷ Supported *Bluetooth* profiles: HDP, SPP, DUN, OBEX OPP, HFP v.1.5, DID, HID + HCI

▷ Industrial temperature range from -40°C to +85°C

▷ RoHS compliant

▷ Simple iWRAP™ firmware for controlling *Bluetooth* wireless technology

▷ Fully qualified end product with *Bluetooth* 2.1 + EDR, CE, FCC and IC

Description

WT11 is a next-generation, class 1, *Bluetooth* 2.1 + EDR module. It introduces three times faster data rates compared to the existing *Bluetooth* 1.2 modules even with a lower power consumption. WT11 is a highly integrated and sophisticated *Bluetooth* module, containing all the necessary elements from *Bluetooth* radio antenna to a fully implemented protocol stack. Therefore WT11 provides an ideal solution for developers who want to integrate *Bluetooth* wireless technology into their designs with limited knowledge of *Bluetooth* and RF technologies.

WT11 module combined with Bluegiga's complete development, testing and verification services and excellent developer support; OEMs and designers ensure that their products reach the market rapidly and cost-efficiently in relation to time and resources. Bluegiga has extensive in-house knowledge of both software and hardware, offering customers a single point of contact to all *Bluetooth* related issues.

By default, WT11 module is equipped with powerful and easy-to-use iWRAP firmware. iWRAP enables users to access *Bluetooth* functionality with simple ASCII commands delivered to the module over serial interface.

Features	WT11	WT12	WT21	WT41
Bluetooth specification	2.0 + EDR, 2.1 + EDR	2.0 + EDR, 2.1 + EDR	2.1 + EDR	2.1 + EDR
Bluetooth class	1	2	1	1
Range, line of sight	250m	40m	120m	1000m
Antenna	Internal or U.FL	Internal, PIN	Internal, PIN	Internal, PIN
Temperature range	-40° to +85°	-40° to +85°	-40° to +85°	-40° to +85°
Maximum throughput	2,1Mbps	2,1Mbps	2,1Mbps	2,1Mbps
Integration	Surface mount	Surface mount	Surface mount	Surface mount
Host interfaces	UART, USB, 6xGPIO,1xAIO	UART, USB, 6xGPIO	UART, CSPI, SDIO, 7xGPIO	UART, USB, 6xGPIO, 1xAI0
Audio interfaces	PCM	PCM	I²S + PCM	PCM
Operating voltage	3.0V- 3.6V	2.7V- 3.6V	1.8V or 2.7V- 4.9V	3.0V- 3.6V
AFH supported	Yes	Yes	Yes	Yes
802.11 co-existence	Yes	Yes	Yes	Yes
Memory	48KB RAM, 8MB Flash	48KB RAM, 8MB Flash	ROM	48KB RAM, 8MB Flash
Chip	BlueCore-04	BlueCore-04	BlueCore-06	BlueCore-04
Supports Bluelab SDK	Yes	Yes	No	Yes
Certifications	*Bluetooth*, CE, FCC, IC, TELEC and MK	*Bluetooth*, CE, FCC, IC and TELEC	*Bluetooth*, CE, FCC and IC	*Bluetooth*, CE, FCC, IC, TELEC and MK
Ability to host applications	Yes	Yes	No	Yes
Firmware options	iWRAP, HCI, Custom	iWRAP, HCI, Custom	HCI	iWRAP, HCI, Custom
Size	35 x 14 x 2,3mm	26 x 14 x 2,4mm	17,1 x 11,6 x 2,6mm	35 x 14 x 3,5mm
Profiles	SPP, DUN, HFP, HSP, HID, AVCRCP, DI, PBAP, OPP, FTP, HDP	SPP, DUN, HFP, HSP, HID, AVCRCP, DI, PBAP, OPP, FTP, HDP	HCI over UART, CSPI, SDIO	SPP, DUN, HFP, HSP, HID, AVRCP, DI, PBAP, OPP, FTP, HDP

How to Integrate a Bluegiga eHealth Module into a Device?

1 Implementation of *Bluetooth* wireless technology

By using Bluegiga's embedded *Bluetooth* wireless technology, enabling your products with *Bluetooth* communications is simple, quick, and cost effective. Our *Bluetooth* modules have been designed for optimal RF performance; incorporate a fully embedded *Bluetooth* 2.1 + EDR stack; and include support for the Health Device Profile (HDP) as well as other commonly used profiles. The benefit to you and your company is shortened development cycles, lower costs, and faster time to market.

Before you begin your medical or health and fitness device design, you should first consider what type of *Bluetooth* module to be implemented. There are typically two configurations:

a) Turnkey modules that incorporate a fully embedded *Bluetooth* stack and HDP profile

b) HCI based modules where the upper layers of the *Bluetooth* stack and HDP profile run in a host-processor and the lower layers are resident within the module

Once your have determined which type (turnkey or HCI) of module best suites your application, you can choose the most suitable module product from Bluegiga's family of embedded *Bluetooth* module solutions. The WT41, WT11, and WT12 *Bluetooth* modules are complete turnkey modules that incorporate our iWRAP *Bluetooth* stack and *Bluetooth* profiles including HDP. The WT41, WT11, WT12 are also available as HCI modules while our WT21 module is only available as an HCI module.

2 Implementing the HDP profile and IEEE agent or manager with embedded iWRAP *Bluetooth* stack

If you decide to incorporate Bluegiga's turnkey module solution that incorporates the iWRAP *Bluetooth* Stack and HDP profile, you will need to consider how to implement the Continua compliant IEEE agent or manager functionality. This can be either included in Bluegiga's *Bluetooth* module or through the externally connected system. This choice determines which of our three iWRAP *Bluetooth* firmware options your application would require:

a) HDP gateway firmware: including HDP only, no IEEE implementation

b) IEEE agent firmware: including HDP as well as IEEE agent(s)

c) IEEE manager firmware: including HDP as well as IEEE manager

The three standard firmware configurations also include the Serial Port Profile (SPP) and a custom firmware load can be created if additional *Bluetooth* profiles are required. We recommend contacting our support team at support@bluegiga.com to discuss the most suitable and efficient implementation for your specific requirements.

3 What is required for development – tools, documentation and examples?

Bluegiga offers a variety of tools to assist in the integration of our *Bluetooth* modules in your design. First, Bluegiga's technical documentation provides necessary technical guidance as you integrate our modules into your design. Second, our evaluation kits provide a convenient, easy to use platform for testing *Bluetooth* connectivity with your hardware. Finally, numerous design guides and application notes are available to help with common *Bluetooth* implementation scenarios.

All technical materials are available from http://techforum.bluegiga.com while our evaluation kits are readily available through Bluegiga's global distribution network.

4 What if you need help during development – technical support and design validation?

At any point in the development process and you reach a stumbling block or have questions about software or hardware please don't hesitate to contact our technical support team at support@bluegiga.com. We have a highly trained team of engineers that can answer all your questions regarding our products.

Even if you are not having any problems during the development process, we encourage you to use our no-cost validation service to check your design's RF, data communications, and/or audio performance. Our goal is to ensure your design provides the best possible *Bluetooth* connectivity and is a success for your and meets your customers expectations for *Bluetooth* communication.

5 Join the *Bluetooth* Special Interest Group

As a member of The *Bluetooth* Special Interest Group you will have access to all relevant information to follow *Bluetooth* brand guidelines as well as official authorization to use *Bluetooth* logos in your general marketing materials. Becoming a member of the *Bluetooth* SIG is free and takes just a few minutes to sign up.

6 List your product to *Bluetooth*.com - Have your product in the qualified *Bluetooth* list

With Bluegiga's *Bluetooth* end product qualified modules you can quickly register for the mandatory end-product listing of your devices. Unlike with *Bluetooth* chipsets and partially certified modules, Bluegiga's modules make your end-product listing free allowing you to register your devices as a qualified product within minutes.

7 Continua certification of your device

All Bluegiga products are designed and tested to satisfy the technical needs of Continua Health Alliance certification. The Continua Health Alliance does require though, that all Continua compliant devices be certified and listed on the Continua website. The Continua certification program is available for Continua members only and process details can be found at the following link: www.continuaalliance.org/products/cert-process.html.

8 Gather the needed country approvals - get your product FCC, CE compliant

You can use Bluegiga product's FCC and CE (and several other country approvals) in your own product qualification stickers and documents. You can access Bluegiga's product qualification numbers from techforum.bluegiga.com or by contacting Bluegiga's support at support@bluegiga.com.

9 Prepare your product marketing material and manuals

After you have completed steps 5-7, you should have a clear understanding of how to emphasize *Bluetooth* functionality in your product literature. There is also a lot of free marketing materials available from The *Bluetooth* SIG and Bluegiga for increasing your brand image with *Bluetooth* wireless technology.

And then…

After your product has been launched, Bluegiga is available to assist you with any compatibility issues that can arise from time to time and we stand ready to deliver our module product needs through our global network of distribution partners.

For more information please contact sales@bluegiga.com.

Bluegiga Customer Solutions and Case Studies

Polar Electro

Polar's Team2 system uses *Bluetooth* wireless technology for easy group heart rate monitoring

Polar is a Finnish company that has emerged as the market leading brand of technology innovations and heart rate monitors since 1977. It helps customers understand their body with a combination of expertise in sports, physiology and electronics, coupled with a deep understanding of customer needs.

Polar's latest addition to their world-class training programs is the Team2 system that allows simultaneous heart rate monitoring for 28 players in real time. The base station is equipped with Bluegiga's class 1, WT11-A-AI *Bluetooth* Module. The module allows +100 meter range and *Bluetooth* communication with Team2 heart rate transmitters during online training sessions.

Team2 group heart monitoring system's flexibility allows teams to monitor each player on your laptop, PDA and the system's wrist units from different locations. The technology used allows creating an ongoing training program to achieve group and individual performance targets.

Target customers for Team2 group heart monitoring system are: athletes, supervised group exercises e.g. spinning, schools and universities, sports institutes and research centers, health care, events, media, military, police and sponsorships.
www.polarelectro.com

Fairbanks Scales

Fairbanks Scales develops a wireless health scale device to take the weighing industry into a new direction

Fairbanks Scales has been a leading manufacturer of weighing equipment for more than 175 years and continues to be on the leading edge of scale technology. Fairbanks developed the TeleWeigh health scale to take the health scale into a new direction and to create a wireless scale that could connect to a variety of devices via *Bluetooth*. The TeleWeigh health scale is used in numerous health care environments from wellness initiatives to remote telehealth monitoring.

In order to provide the best possible scale for the demanding telehealth industry, it was essential to have the longest battery life possible, the most robust wireless communications and the ability to communicate with many different platforms. Fairbanks tested and evaluated several different solutions. However, none of the tested solutions fit the needs of the product as well as the WT11 *Bluetooth* module from Bluegiga Technologies Oy.

Health care providers worldwide are using Fairbanks' TeleWeigh scale, which utilizes *Bluetooth* wireless technology to provide state of the art health care to patients. Lives are saved, and chronic conditions are treated, while cutting the providers' costs by utilizing Bluegiga's WT11 *Bluetooth* module.
www.fairbanks.com

BodyTel

GlucoTel, a *Bluetooth* enabled blood glucose meter

BodyTel is a German-American company that specializes in telemedical monitoring and management systems for chronic diseases, particularly diabetes.

BodyTel's flagship product, GlucoTel, is a *Bluetooth* enabled blood glucose meter (built-in Bluegiga WT12 module) that uses a Java, *Bluetooth* and Internet enabled cell phone to automatically and wirelessly transmit measured blood glucose values to a secure internet database.

With GlucoTel patients can continue to perform their daily monitoring as usual and still their results will be automatically transmitted to the secure internet database. BodyTel Mobile (Java application) provides patients with the ability to easily add additional values (e.g. meals, medication, sports) into the cell phone and from there into the online database as well. Patients have the ability to grant database access to other people such as healthcare professionals and caregivers. Authorized healthcare professionals and caregivers will then have accurate information, so that they can quickly adjust their treatment as needed to help improve their patient's quality of life.
www.bodytel.com

Mindray

Patient monitoring wirelessly and safely from your home

Mindray was founded in 1991 in China with the goal of delivering high-quality, competitively priced medical devices to make healthcare more accessible and affordable around the world. Today, it is a leading developer, manufacturer and marketer of medical devices worldwide.

The company has three well-established business segments: Patient Monitoring and Life Support Products, In-Vitro Diagnostic Products and Medical Imaging Systems.

Mindray's new wireless patient monitoring device measures patient's condition safely in his own home. It shows the results on the display to the patient and then forwards the information through a mobile network services platform to a nurse or other medical staff in a nearby hospital. The medical staff then analyzes the results and determines if the patient should visit the hospital. The solution is ideal for elderly patients with long term illnesses that cannot move well on their own. It saves the time and energy to go to the hospital for minor checkups.

The wireless connection comes from Bluegiga's *Bluetooth* WT12-A-AI4 module which is built inside the monitoring unit.
www.mindray.com

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