FEATURES

The module adaptation board provides fast and easy way to control the ALPW-BLEM003. The module adaptation board is delivered with integrated stack, sample application, which provides a complete development platform.

- Used together with the ALPW-BLESDE® products, provides a complete evaluation platform
- Easy connection to application daughter or mother boards thanks to the pin headers
- Dimensions 35mm x 50 mm
- Module footprint is compatible with all Alpwise modules
- Power supplied though USB
- Equipped with a JTAG connector for Debug and firmware Programming
- U.FL Connector for an external antenna

KIT CONTENTS
- ALPW-MAB003 Adaptation Board
- ALPW-BLEM003, *Bluetooth*® low energy module mounted on the adaptation board ALPW-MAB003
- User Guide

APPLICATIONS

- Medical Devices
- Mobile Accessories
- Sport and Fitness
- Entertainment Devices
- Wireless Sensors
- Consumer Electronics
- Monitoring and Control
- Industrial
- Building Automation

DESCRIPTION

The Alpwise *Bluetooth®* low energy easy kit is an ultra low power platform for rapid prototyping and evaluating of your *Bluetooth®* low energy solutions, thus facilitates the complete development of your wireless product.

A Debug standard connector (20 pins) allows programming and debugging the embedded module.

Table of contents

Table of figures

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Revision 1.0

1

1 Overview

Below is an overview on the Alpwise Bluetooth Low Energy development kit.

- Adaptation board : ALPW-MAB003
- Bluetooth Module : ALPW-BLEM003
- Optional development board: ALPW-DVBBLE

The optional ALPW-DVBBLE board can be connected on the ALPW-DVKCM3. This board integrates an accelerometer, a temperature sensor and user interfaces (LEDs, switches and buzzer). Furthermore, the board can be powered by a super capacitor, thus allowing an autonomous demonstration of the Bluetooth Low Energy possibilities.

2 Product Description

2.1 Module

The ALPW-BLEM003 is a complete Bluetooth Low Energy module, designed around an energy efficient Cortex M0 microcontroller.

The module exports several interfaces, such as 1 UART, 4 ADCs, an I2C bus, a Debug interface and general purpose I/Os.

The module is soldered on the adaptation board ALPW-MAB003.

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Revision 1.0
2

2.2   Easy Kit overview
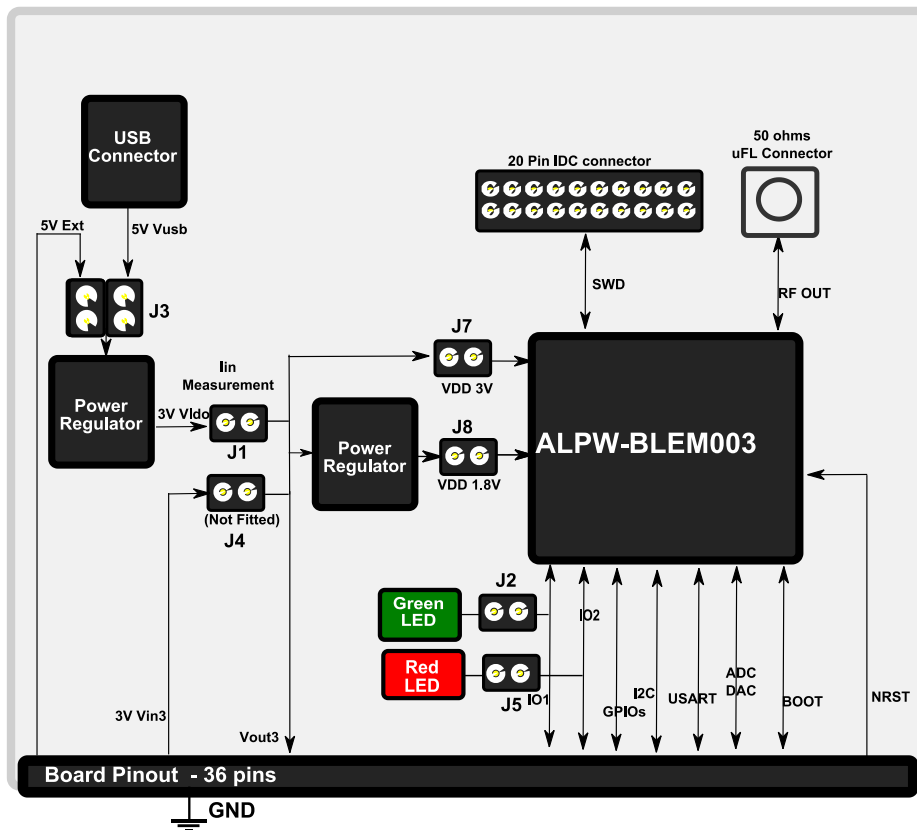
Figure1.: ALPW-BLEEASYKIT block diagram
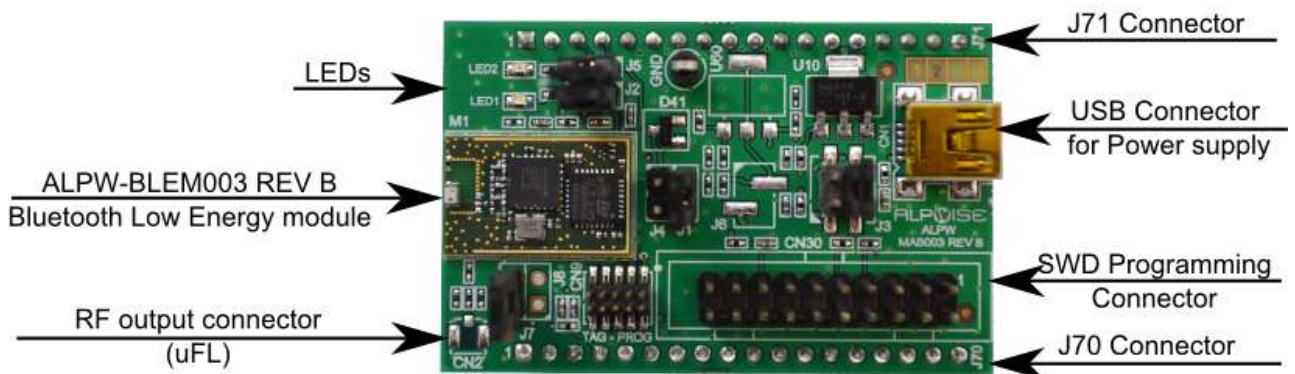
Figure2.: ALPW-BLEEASYKIT kit description

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Revision 1.0
3

Kit side Connectors	18 pins, 1 row header connectors (2.54mm pitch). Used to connect the optional development board, or for user application.
USB Connector	Used as main power source
SWD Connector	Standard 20-pin connector for MCU programming and debug.
ALPW-BLEM003 Modul	Alpwise Bluetooth Low Energy Embedded module, soldered on the board
LEDs Jumpers	MCU I/O can be connected to the kit LEDs, or left unconnected for user application.

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Revision 1.0
4

3 Detailed Description

3.1 Kit Side Connectors Pinout

Pin N°	Signal Name	Description
		J70 Connector
1	VIN_EXT_5V	External 5V Input
2	VIN_EXT_3V	External 3V Input
3	GND	Ground
4	VOUT_3V	3V power supply output
5	RST	MCU RESET signal
6	BOOT	MCU BOOT Signal
7	USART_RX	USART Receive Data
8	NC	
9	NC	
10	ADC4/DAC	Analogue Converter Input
11	ADC3	Analogue Converter Input
12	NC	
13	GND	Ground
14	ADC2	Analogue Converter Input
15	I2C_SMBA	I2C SMBus Alert
16	USART_TX	USART Transmit Data
17	NC	
18	USART_CTS	USART Clear To Send
		J71 Connector
1	NC	
2	NC	
3	IO1	General Purpose I/O 1
4	IO2	General Purpose I/O 2
5	NC	
6	NC	
7	USART_CLK	USART Clock
8	I2C_SDA	I2C Data
9	I2C_SCL	I2C Clock
10	ADC1	Analogue Converter Input
11	GND	Ground
12	USART_RTS	USART Request to Send
13	VDDA	Analogue Power supply
14	NC	
15	GND	Ground
16	NC	
17	NC	
18	GND	Ground

Figure3.: ALPW-BLEEASYKIT pin description

Note :   - The connector pin number 1 is square.

*   - The NC pins are Not Connected to any components*

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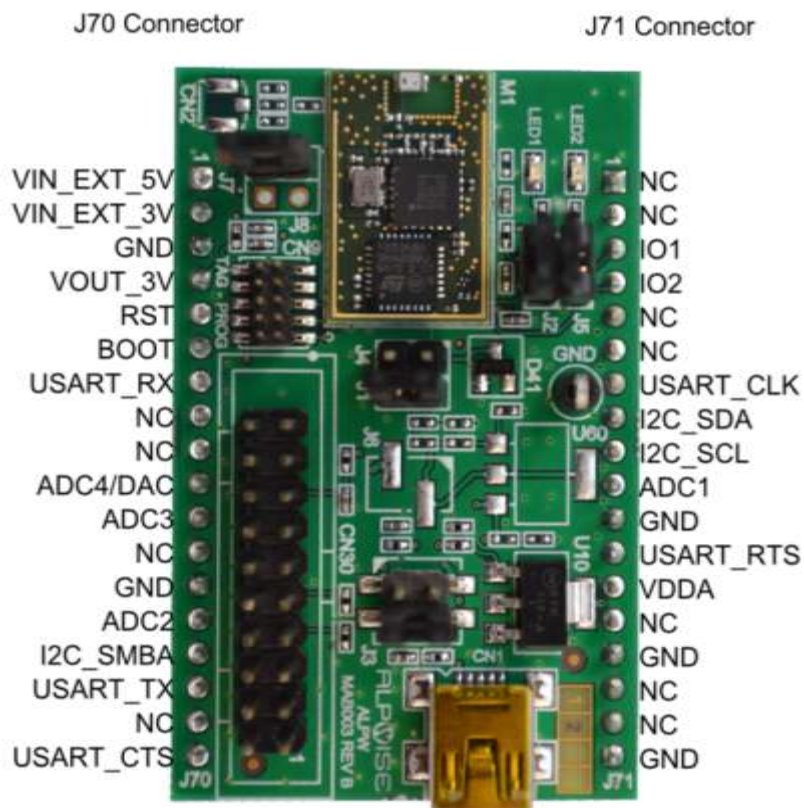
Revision 1.0
5

Figure4.: ALPW-BLEEASYKIT pinout

3.2 Power Supply

The ALPW-BLEM003 requires a 3.0V stable power supply. It can be powered through an internal power supply regulator, or using the external 3V input (refer to the kit pinout). Note that the external 3.0V input is protected against over voltages, but one should ensure a proper filtering and decoupling when using it.
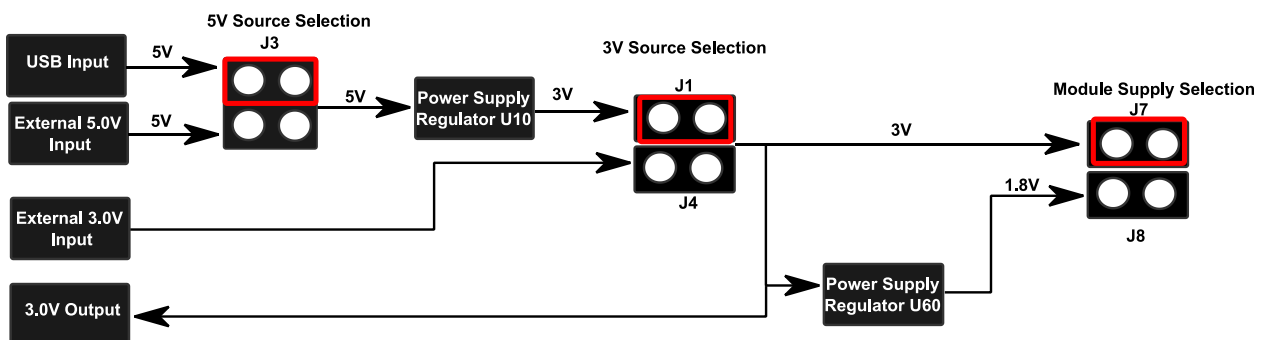

Figure5.: ALPW-BLEEASYKIT power supply tree

Refer to the jumper configuration chapter to get the right configuration, depending on your application.

3.3 Kit Configuration
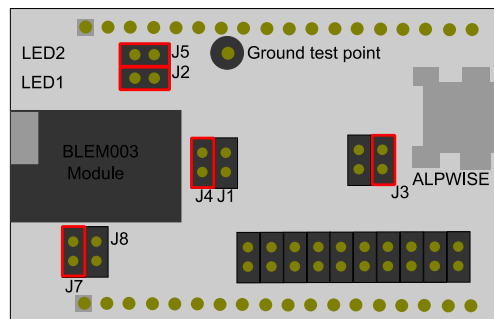
3.3.1 Jumper Configuration

Figure6.: ALPW-BLEEASYKIT default jumper configuration

When delivered the jumper are placed as described above. The kit is intended to operate when connected to a powered USB port, the module is supplied using the internal regulator. The module I/Os are connected to the on-board LEDs.

- **Application from an external 3V Supply**

If you are using a 3V external power supply, the following jumper configuration applies:
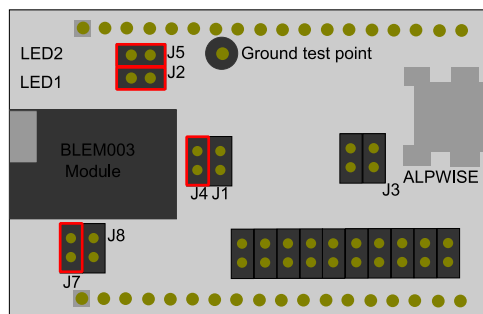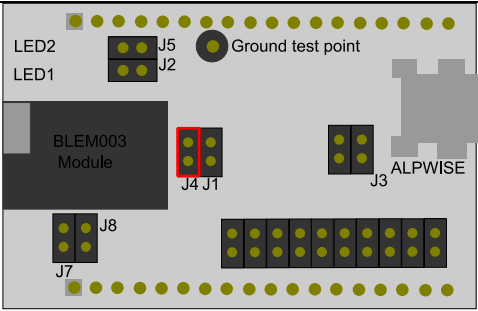
Figure7.: ALPW-BLEEASYKIT jumper configuration for external 3V aplciation
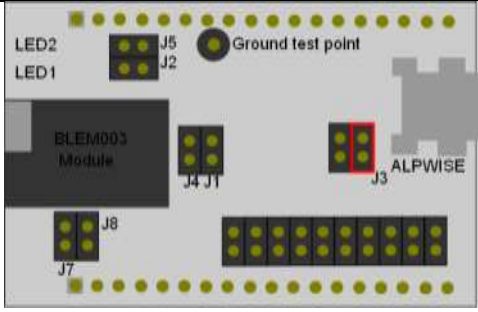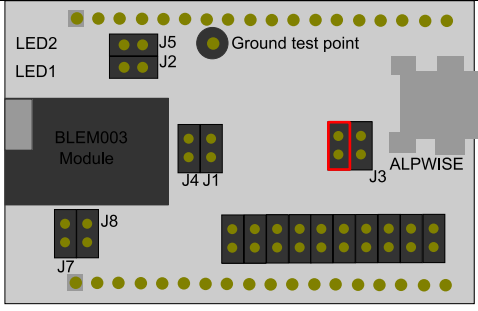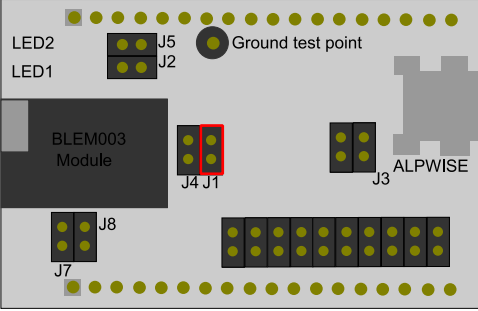
- **Application from an external 5V Supply**

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Revision 1.0
7

J3	**5V power source selection**		The 5V is provided by the USB
			The 5V is provided externally, on J70.1.
J4/J1	**3V power source selection**		The 3V is created the the internal regulator. In this configuration it is necessary to provide a 5V power source.
			The 3V source is provided externally, on J70.2. In this configuration, no 5V power source is necessary. J3 can be removed.
J7	**Module Power Supply**	If J7 is set, the module is powered with 3V. Do not connect J8 at the same time.	
J8[1]	**Module Power Supply**	If J8 is set, the module is power with 1.8V. Do not connect J7 at the same time.	
J2/J5	**LEDs connection**	The module exports two general-purpose I/Os. By default they are connected to two LEDs on the board. Remove the jumpers to disconnect the I/Os from the LEDs and use it for your applciation. They are available on J71.3 & J71.4.	

[1] On new kits, the J8 connector is no longer provided as long as the 1.8V power supply chain.

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Revision 1.0
8

4 Firmware development

4.1 Hardware setup

In order to download and debug embedded applications, the ALPW-BLEEASY Kit must be powered using the USB connector (or an external input power) and a compliant SWD hardware debugger (JLINK, ULINK, …) must be connected to the ALPW-BLEEASY Kit standard JTAG connector. Please refer to the jumper configuration chapter in order to setup the kit properly.

The ALPW-BLEEASY KIT uses a standard 20-pin connector for MCU programming and debug.

The software can be downloaded using any SWD compliant tool (for example KEIL toolchain or the GCC/ECLIPSE toolchain), please refer to the "**ALPWISE BLE SDK for BLEM003 Overview**" documentation, part of the ALPW-BLESDKBLEM003 for more information to setup KEIL or GCC/ECLIPSE

4.2 ALPWISE Bluetooth Low Energy SDK

The ALPW-BLEEASYKIT is delivered with the ALPW-BLEEASYSDE.

The ALPW-BLEEASYSDE is a software development kit containing the software and tool to exploit the ALPW-BLEEASY Kit.

The ALPWISE *Bluetooth*® low energy SDK (ALPW-BLESDK) suite is a Software Development Kit which enables developers to easily develop *Bluetooth*® low energy applications and provides facilities and services to characterize the technology capability.

Used together with the ALPWISE Development Kits, developers get an easy way to develop, test and validate their application on PC and on the embedded dedicated application microcontroller.

The ALPW-BLESDK ® for BLEM003 targets the ALPWISE *Bluetooth*® low energy module ALPW-BLEM003. It allows an integrator to focus developing embedded *Bluetooth*® low energy applications.

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Revision 1.0
9

The ALPW-BLESDK$^®$ for BLEM003 already includes and implements all the porting and integration layers needed by the ALPW-BLEM003 in order to let the developer focus on the application development.

Allow with the SDK, ALPWISE is providing a set of tools allowing the developer to quickly setup its application.

Note: The ALPWISE SDK for BLEM003 is currently in BETA version and source code, libraries and documentation will change since release.

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Revision 1.0
10

4.3 ALPW-BLESDK® for BLEM003 architecture Overview
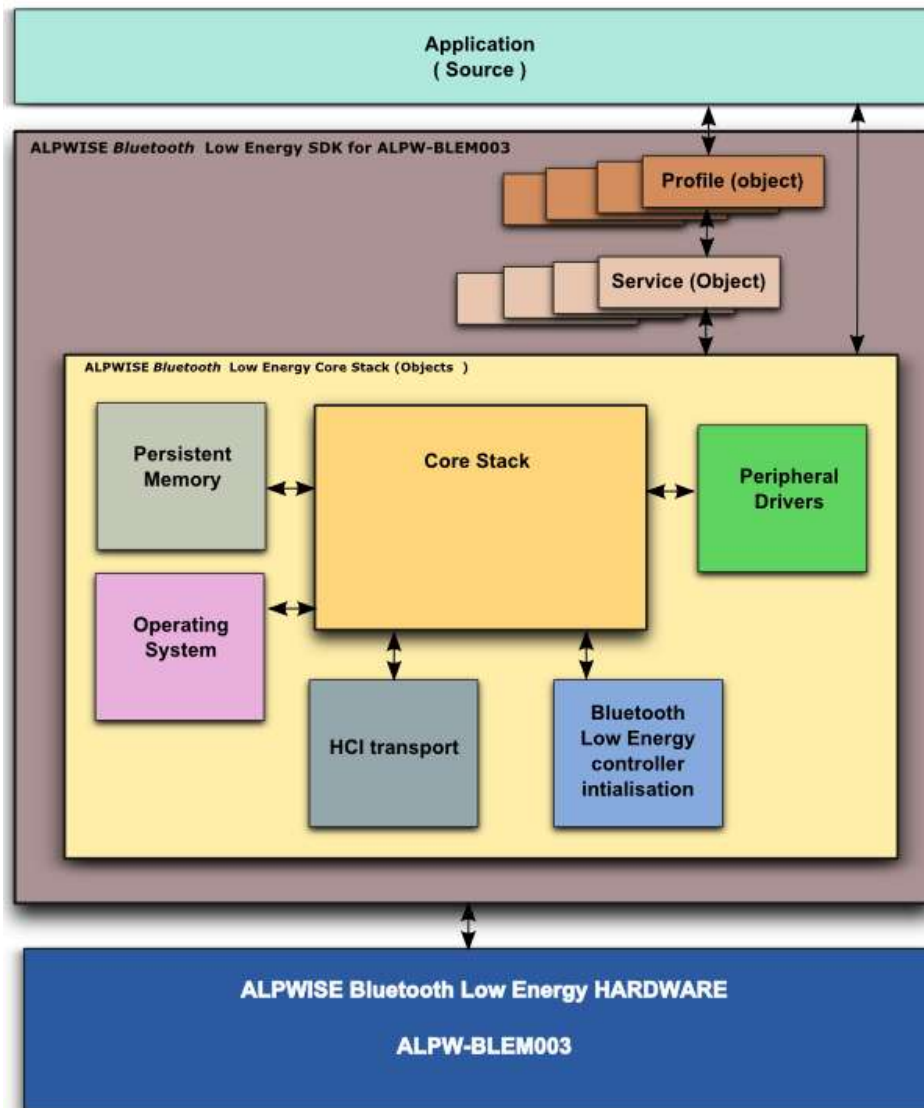
The ALPWISE *Bluetooth*® Low Energy core stack libraries (BLESW_CoreStack_BLEM003 or BLESW_CoreStack_Monitor_BLEM003) includes the **core stack** component which implements the defined *Bluetooth*® specification version 4.0 protocols and profiles:

- HCI : the Host controller Interface layer
- L2CAP : Logical Link Control and adaptation Protocol
- SMP : The Security manager Protocol
- GAP : The generic Access Profile.
- ATT : the Attribute protocol
- GATT : the Attribute Profile

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Revision 1.0
11

The core stack library also includes all the Core stack required resources and HARDWARE management and interaction, including ALPW-BLEM003 integration. As well, *Bluetooth*® Low Energy **Services** and **Profiles** are available as libraries.

Application may access to the ALPWISE *Bluetooth*® Low Energy core stack API, GAP API, SMP API or profile API to build a *Bluetooth*® Low Energy enabled Application.

4.4   Application development

The ALPWISE Software Development Kit includes high-level libraries, exposing easy to use and comprehensive Application Programming Interfaces (API).

The libraries are targeted for Cortex-M0 microprocessors;

It exist two libraries for the core stack, and one library per service and per Profile. Profile library will depend on service and core stack libraries.

The libraries are built with/for the free Gnu Compiler (gcc) toolchain and for the KEIL toolchain.

The ALPWISE Software Development Kit for BLEM003 includes as well sample application for some of the profiles available, provided in source code

4.5   Software resources

Please refer to the "**ALPWISE BLE SDK for BLEM003 Overview**" documentation, this documentation is part of the SDK and contain useful information to setup the development tools.

As well the Stack and profile documentation folder provides API guide and application notes to start developing Low Energy enabled application.

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Revision 1.0
12

5   Device operating requirements

5.1   Absolute Maximum Ratings

The absolute maximum ratings listed below have not been tested, and correspond to the main components specifications. Stresses beyond those limits may cause permanent damage to the module.

Symbol	Description	Value	Unit
V_{ext_3V}	External Supply Voltage	-0.3 to 3.5	V
Vin	Input Voltage on any pin	-0.3 to 4.0	V
|Vssx – Vss|	Voltage difference between all power or ground pins	50	mV
$V_{ESD(HBM)}$	Electrostatic discharge (Human Body Model)	2000	V
V_{RF_IN}	Input RMS voltage to uFL Connector [1]	-0.5 to 2.1	V
$T_{storage}$	Storage temperature range	-65°C to +150	°C

[1] In order to use the uFL connector, the ALPW-BLEM003 needs to be able to output the RF signal. Refer to the ALPW-BLEM003 datasheet .

5.2   Recommended operating conditions

Symbol	Description	Note	Min	Typical	Max	Unit
V_{USB}	USB Supply Voltage		4.75	5.0	5.25	V
V_{bat}	Battery Voltage		2.5	3.0	3.2	V
I_{max}	Overall maximum USB Input current	USB 2.0	-	-	500	mA
		USB 3.0	-	-	900	
I_{supply}	Supply Current for external application		-	-	800	mA
T°	Operational Temperature Range		-10	-	+85	°C

[1] Using USB 2.0.

5.3   Electrical Characteristics

Please refer to the ALPW-BLEM003 REV. B module datasheet for detailed electrical characteristics (power consumption, RF performances, requirements).

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Revision 1.0
13

6 Packaging

The ALPW-BLEEASY kit package contains:

- ALPW-MAB003 Adaptation Board
- ALPW-BLEM003, *Bluetooth*® low energy module mounted on the adaptation board ALPW-MAB003
- A User's guide

7 User Guide Resources

7.1 Related Documents

- ALPW-BLEM003 Bluetooth Low Energy Module Datasheet
- ALPW-BLESDK documentation

7.2 Support

For any technical questions regarding usage of this BLE Evaluation Kit, please consider the following Email address:

alpwisesales@alpwise.com

7.3 Sales

For any commercial questions regarding access of this BLE Evaluation Kit, please consider the following Email address:

alpwisesales@alpwise.com

7.4 Contact information

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Revision 1.0
14

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Revision 1.0
15