BLUE TECHNIX

Hardware User Manual

RFID2USB-Stick V1.2

...maximum performance at minimum space

Contact

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Document No.: 909-2131-1.3

Date: 2011-12-09

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Information

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Warning

Due to technical requirements components may contain dangerous substances.

Blackfin® Core Modules

TCM-BF518-C-C-Q25S32F2 (TCM-BF518)

The Tiny Core Module TCM-BF518 is powered by Analog Devices' single core ADSP-BF518 processor; up to 400MHz, 32MB SDRAM, up to 8MB flash. The 2x60 pin expansion connectors are backwards compatible with other Core Modules.

ACM-BF525C-C-C-Q25S64F4N1024

The Core Module ACM-BF525C is optimized for audio applications and performance. It is based on the high performance ADSPBF525Cfrom Analog Devices. It addresses 64MByte SDRAM via its 16bit wide SDRAM bus, has an onboard NOR-flash of 4MByte and a NAND-flash with 1024MByte.

CM-BF527-C-C-Q50S32F8 (CM-BF527)

The Core Module CM-BF527 is powered by Analog Devices' single core ADSP-BF527 processor; key features are USB OTG 2.0 and Ethernet. The 2x60 pin expansion connectors are backwards compatible with other Core Modules.

CM-BF533-C-C-Q25S32F2 (CM-BF533)

The Core Module CM-BF533 is powered by Analog Devices' single core ADSP-BF533 processor; up to 600MHz, 32MB SDRAM, 2MB flash, 2x60 pin expansion connectors at a size of 36.5x31.5mm.

TCM-BF537-C-I-Q25S32F8 (TCM-BF537)

The Tiny Core Module TCM-BF537 is powered by Analog Devices' single core ADSP-BF537 processor; up to 500MHz, 32MB SDRAM, 8MB flash, a size of 28x28mm, 2x60 pin expansion connectors, Ball Grid Array or Border Pads for reflow soldering, industrial temperature range -40℃ to +85℃.

CM-BF537-C-C-Q25S32F4 (CM-BF537E)

The Core Module CM-BF537 is powered by Analog Devices' single core ADSP-BF537 processor; up to 600MHz, 32MB SDRAM, 4MB flash, integrated TP10/100 Ethernet physical transceiver, 2x60 pin expansion connectors at a size of 36.5x31.5mm.

CM-BF537-C-C-Q30S32F4-U (CM-BF537U)

The Core Module CM-BF537 is powered by Analog Devices' single core ADSP-BF537 processor; up to 600MHz, 32MB SDRAM, 4MB flash, integrated USB 2.0 Device, 2x60 pin expansion connectors at a size of 36.5x31.5mm.

CM-BF548-C-C-Q25S64F8 (CM-BF548)

The Core Module CM-BF548 is characterized by its numerous peripheral interfaces, its performance in combination with its high speed memory interface (DDR). Key features are 533MHz, 64MB DDR SD-RAM (266MHz), and 8MB flash.

CM-BF561-C-C-Q25S64F8 (CM-BF561)

The Core Module CM-BF561 is powered by Analog Devices' dual core ADSP-BF561 processor; up to 2x 600MHz, 64MB SDRAM, 8MB flash, 2x60 pin expansion connectors at a size of 36.5x31.5mm.

eCM-BF561-C-C-Q25S128F32 (eCM-BF561)

The Core Module CM-BF561 is powered by Analog Devices' dual core ADSP-BF561 processor; up to 2x 600MHz, 128MB SDRAM, 8MB flash, 2x100 pin expansion connectors and a size of 44x33mm.
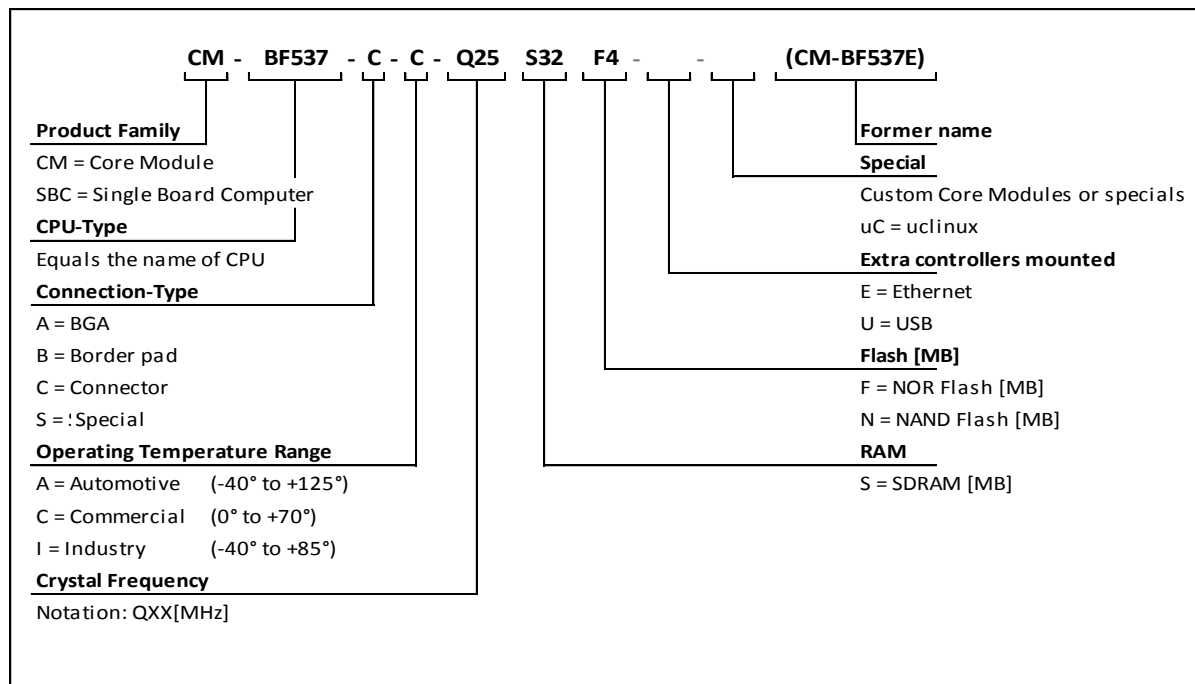
Core Module naming information

The idea is to put more Core Module specific technical information into the product name. New Core Module names will have following technical information covered in their names.

- Product Family,
- CPU-Type,
- Connection-Type,
- Operating Temperature Range,
- Crystal Frequency [MHz],
- RAM [MB],
- Flash [MB],
- External Controllers
- Optional
  - Special and/or
  - Former name

That expands of course the name but allows the customer to get the most important Core Module specific information at the first sight. Have a look at the example below to get an idea of the new Core Module names.

Example CM-BF537-C-C-Q25S32F4 (CM-BF537E)

CM - **BF537** - **C** - **C** - **Q25** **S32** **F4** - - **(CM-BF537E)**

Product Family
CM = Core Module
SBC = Single Board Computer

CPU-Type
Equals the name of CPU

Connection-Type
A = BGA
B = Border pad
C = Connector
S = Special

Operating Temperature Range
A = Automotive (-40° to +125°)
C = Commercial (0° to +70°)
I = Industry (-40° to +85°)

Crystal Frequency
Notation: QXX[MHz]

Former name

Special
Custom Core Modules or specials
uC = uclinux

Extra controllers mounted
E = Ethernet
U = USB

Flash [MB]
F = NOR Flash [MB]
N = NAND Flash [MB]

RAM
S = SDRAM [MB]

Blackfin® Development Boards

ADEV-BF52xC

Feature rich, low cost embedded audio development platform which supports Audio Core Modules (ACM). The form factor of the ADEV-BF52xC allows easy integration of the board into OEM products. Dedicated interfaces such as USB2.0, Line In/Out, headphone out and an onboard silicon microphone turn the ADEV-BF52xC into a full-featured development platform for most embedded audio applications in commercial areas.

DEV-BF5xxDA-Lite

Get ready to program and debug Bluetechnix Core Modules with this tiny development platform including an USB-Based Debug Agent. The DEV-BF5xxDA-Lite is a low cost starter development system including a VDSP++ Evaluation Software License.

DEV-BF548-Lite

Low-cost development board with a socket for Bluetechnix' CM-BF548 Core Module. Additional interfaces are available, e.g. an SD-Card, USB and Ethernet.

DEV-BF548DA-Lite

Get ready to program and debug Bluetechnix CM-BF548 Core Module with this tiny development platform including an USB-Based Debug Agent. The DEV-BF548DA-Lite is a low-cost starter development system including a VDSP++ Evaluation Software License.

eDEV-BF5xx

Feature rich, low cost rapid development platform which provides all interfaces on dedicated connectors and has all Core Module pins routed to solder pads which easily can be accessed by the developers. The eDEV-BF5xx supports the latest debugging interface from Analog Devices - ADI-SADA (Analog Devices Stand Alone Debug Agent).

EVAL-BF5xx

Tiny, low cost embedded platform which supports Bluetechnix powerful Blackfin® based Core Modules. The form factor (75x75mm) of the EVAL-BF5xx allows easy integration of the board into OEM products. Dedicated interfaces such as USB2.0, SD-card slot, CAN interface connectors and of course Ethernet, turn the EVAL-BF5xx into a full-featured evaluation platform for most embedded applications.

Extender boards

Extender boards (EXT-BF5xx) are expanding the development and evaluation boards by several interfaces and functionalities. Targeted application areas are: audio/video processing, security and surveillance, Ethernet access, positioning, automation and control, experimental development and measuring.

Note! Bluetechnix is offering tailored board developments as well.

1 Introduction

The RFID2USB-Stick is a development stick especially designed for contactless general purpose Near-Field-Communications (NFC) applications. This stick is based on the contactless RFID 13.56 MHz technology and supports NFCIP-1 mode (ISO/IEC 18092), ISO 14443A/Mifare as well as ISO 14443B reader/writer standards. Supported contactless smart cards are MIFARE and FeliCa. For easy usage, it has an onboard JTAG connector and is powered through a USB-A Connector.

1.1 Overview

Figure 1-1 shows the main components of the RFID2USB-Stick.
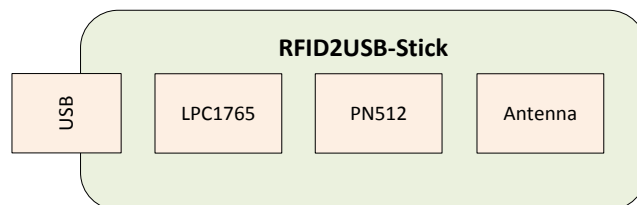

Figure 1-1: Main components of the RFID2USB-Stick

1.2 Key Features

- **NXP LPC1765 (ARM Cortex M3) Processor**

- **PN512 RFID chip**
  - Reader/Writer mode supporting ISO/IEC 14443A/MIFARE and FeliCa scheme
  - Reader/Writer mode supporting ISO/IEC 14443B
  - Card Operation mode supporting ISO/IEC 14443A/MIFARE and FeliCa scheme
  - NFCIP-1 mode (ISO/IEC 18092)

- **Connectors**
  - USB-A connector for power supply and host communication
  - JTAG

1.3 Applications

- Access control
- Authentication
- Micro-payment
- NFC mobile tag
- Online purchase
- Customer loyalty
- Time and attendance
- e-payment

2 General Description

2.1 Functional Description

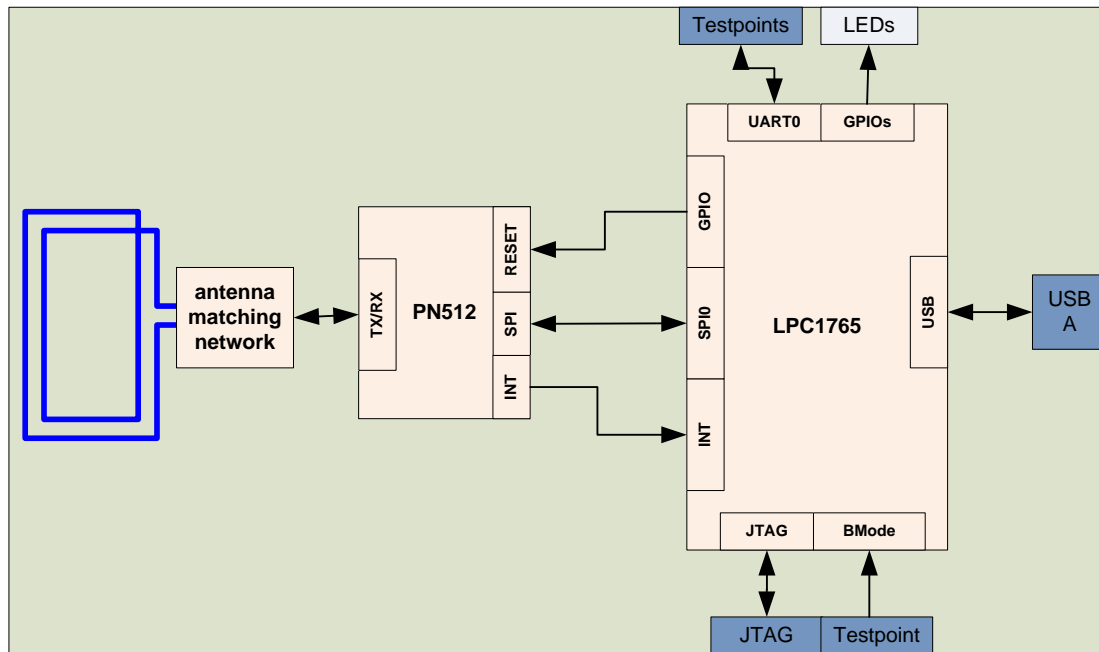The RFID2USB-Stick includes the following components:

Figure 2-1: Overview of the RFID2USB-Stick

- **Processor**
  - o NXP LPC1765FBD100
    - 256KB FLASH
    - 64KB RAM
    - High speed USB 2.0 interface

- **RFID chip**
  - o NXP PN512 connected to LPC1765 via SPI

- **JTAG**
  - o JTAG-Plug that supports the ARM JTAG through a special JTAG adapter

- **USB A**
  - o Standard USB A interface connected to LPC1765

- **Power supply**
  - o 5V power supply through USB A connector

- **Antenna matching network**
  - o Matching of the antenna impedance to the PN512 impedance
  - o Increasing the antenna bandwidth (at 13,56MHz)
  - o Reducing electromagnetic emission

- **Loop antenna**
  - o Loop antenna printed on PCB (3R / 3µH at 13,56MHz)

- **LEDs**
  - o Dual color status LED connected to the LPC1765

Pin No.	Signal Name	Type	Function
32	P1.18	I/O	LED red
34	P1.20	I/O	LED green

Table 2-1: Status LEDs

2.2 Boot Mode

- **Enable UART Boot mode**
  - o To enter UART boot, P1 has do be set to GND before powering the board.
  - o In UART boot mode, the firmware can be flashed through P5(RX), P6(TX) by using the NXP "Flash magic" or another UART flash programming tool.

3 Specifications

3.1 Electrical Specifications

3.1.1 Operating Conditions

Symbol	Parameter	Min	Typical	Max	Unit
V_{IN}	Input supply voltage	4.5	5	5.5	V

Table 3-1: Electrical characteristics

3.1.2 Maximum Ratings

Stressing the device above the rating listed in the absolute maximum ratings table may cause permanent damage to the device. These are stress ratings only. Operation of the device at these or any other conditions greater than those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input supply voltage	4.3	7	V
T_{STO}	Storage temperature	-40	90	°C
T_{OP}	Operating temperature	-20	70	°C
φ_{AMB}	Relative ambient humidity		90	%

Table 3-2: Absolute maximum ratings

3.1.3 ESD Sensitivity

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

4 Connector Description

4.1 Connector (JTAG) X1

JTAG connector LPC1765

Pin No.	Signal Name	Type	Function
1	TDI	I - 10k pull up	Test Data In
2	RTCK	I/O – 4k7 pull down	JTAG Interface Control
3	TMS	I/O – 10k pull up	Test Mode Select
4	TDO	O – 10k pull up	Test Data Out
5	nTRST	I – 10k pull up	Test Reset
6	NC	-	-
7	TCK	I – 4k7 pull down	Test Clock
8	3V3	Power	
9	nRESET	I – 10k pull up	External Reset
10	GND	Power	

Table 4-1: Connector description X1

4.2 Connector (USB-A) X2

Pin No.	Signal Name	Type	Function
1	VCC	Power	
2	D-	I/O	USB D- line
3	D+	I/O	USB D+ line
4	GND	Power	

Table 4-2: Connector description X2

4.3 Test points Px

Test point No.	Signal Name	Type	Function
P1	P2.10	Power	A LOW level on this pin during reset starts the ISP command handler.
P2	GND	I/O	USB D- line
P3	3V3	I/O	USB D+ line
P4	VUSB	Power	
P5	UART0 RX	I/O	Transmitter output for UART 0
P6	UART0 TX	I/O	Transmitter output for UART 0
P7	USB D+	I/O	USB D+ line
P8	USB D-	I/O	USB D- line
P9	VUSB	Power	

Table 4-3: Test point description

5 Mechanical Outline

5.1 Top View

Figure 5-1 shows the top view of the mechanical outline of the RFID2USB-Stick. All dimensions are given in millimeters! Outline dimensions +/- 0,5mm.
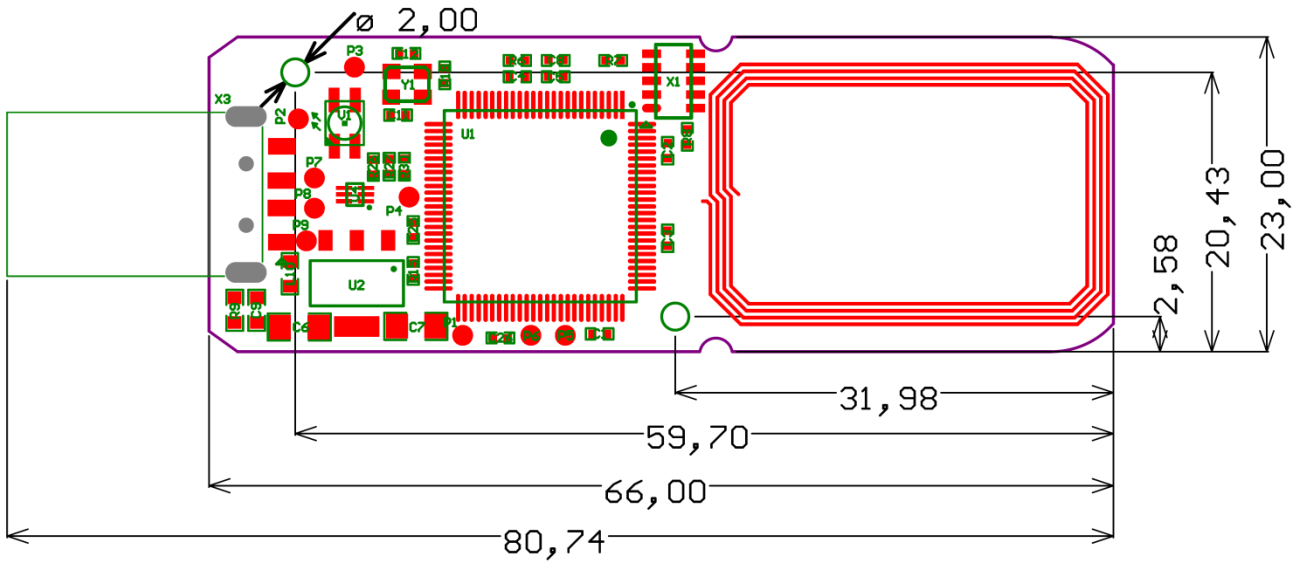

Figure 5-1: Mechanical outline (top view)

5.2 Bottom View

Figure 5-2 shows the bottom of the mechanical outline of the RFID2USB-Stick. All dimensions are given in millimeters!
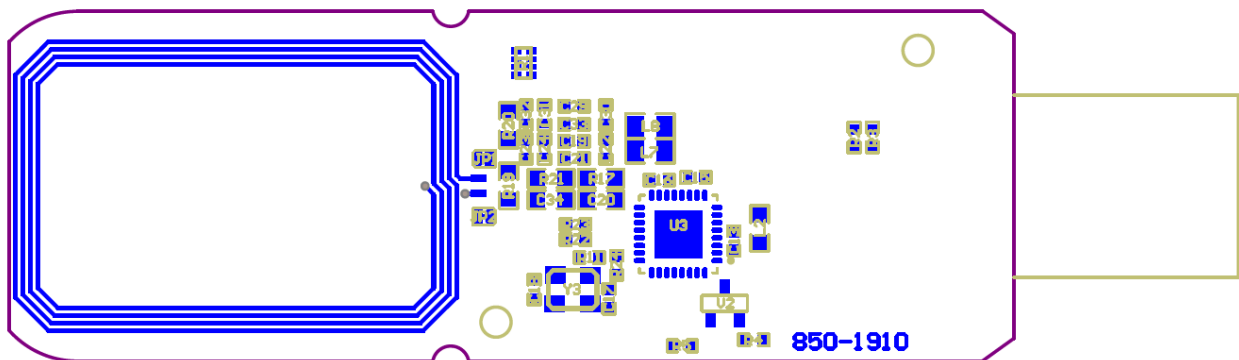

Figure 5-2: Mechanical outline (bottom view)

6 Product History

6.1 Version Information

Version	Date	Changes
1.2	2011 02 11	First release V1.2 of the hardware.

Table 6-1: Overview product changes

6.2 Anomalies

Version	Date	Description
1.2	2011 02 11	No anomalies reported yet.

Table 6-2: Overview product anomalies

7 Document Revision History

Version	Date	Document Revision
1	2011 02 11	First release V1.0 of the Document
2	2011 08 31	Changed product photo.
3	2011 12 09	Changed 2.1 Functional description

Table 7-1: Revision history

8 List of Abbreviations

Abbreviation	Description
ADI	Analog Devices Inc.
AI	Analog Input
AMS	Asynchronous Memory Select
AO	Analog Output
CM	Core Module
DC	Direct Current
DSP	Digital Signal Processor
eCM	Enhanced Core Module
EBI	External Bus Interface
ESD	Electrostatic Discharge
GPIO	General Purpose Input Output
I	Input
I²C	Inter-Integrated Circuit
I/O	Input/Output
ISM	Image Sensor Module
LDO	Low Drop-Out regulator
MTBF	Mean Time Between Failure
NC	Not Connected
NFC	NAND Flash Controller
O	Output
OS	Operating System
PPI	Parallel Peripheral Interface
PWR	Power
RTOS	Real-Time Operating System
SADA	Stand Alone Debug Agent
SD	Secure Digital
SoC	System on Chip
SPI	Serial Peripheral Interface
SPM	Speech Processing Module
SPORT	Serial Port
TFT	Thin-Film Transistor
TISM	Tiny Image Sensor Module
TSC	Touch Screen Controller
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
USBOTG	USB On The Go
ZIF	Zero Insertion Force

Table 8-1: List of abbreviations

A   List of Figures and Tables

Figures

Tables