

*Programmable OEM radio board for wireless applications based on Atmel's AVR ATmega128 processor.*

## BASIC SPECIFICATIONS

Module	Processor	RAM	EEPROM	Flash	Peripherals
iDwaRF-Box V1.2	ATmega128	36kB SRAM	4kB EEPROM	128kB Flash	<ul style="list-style-type: none"> <li>- CYWUSB6935 radio transceiver</li> <li>- CP2102 USB UART converter</li> <li>- RTC8564JE realtime clock chip</li> <li>- SD-card header</li> <li>- XPort ethernet interface (optionally)</li> </ul>

### High Performance / Low Power Consumption

- up to 8MHz operating frequency
- external 4.8-16V power supply with internal 3.3V regulator

### Familiar Onboard Peripherals

- CP2102 USB UART converter for PC USB connection
- Lantronix XPort ethernet converter for 10/100/1000 Base-T network connection
- RTC8564JE realtime clock chip
- standardSD-card header

### Wireless Peripherals

- CYWUSB6935 2.4GHz DSSS radio transceiver
- world wide usage due to non-licensed 2.4-2.483GHz band
- -95dBm receiver sensitivity, 0dBm output power
- SMA-reverse connector for external antenna
- +50m range
- data throughput up to 62.5kbit/s

### Connectors

- standard 2.54mm header for SavvyDISP connection
- 6-pin AVR ISP connector
- 3.5mm pitch power connector

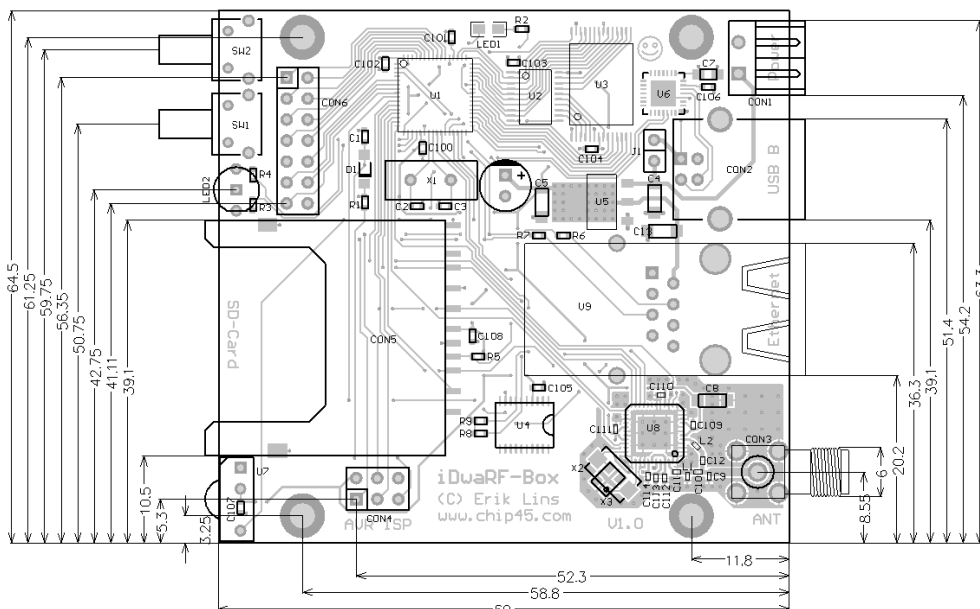


## SCOPE OF DELIVERY

This module is being shipped without pin headers and connectors (THT components) preinstalled. The following components are included as kit: SMA connector, USB-B connector, power jack and mating connector, ISP header, 7.3728MHz crystal, 2 push buttons and dual color LED.

## PHYSICAL DIMENSIONS

Values are [mm] unless otherwise noted.



## PIN CONFIGURATION

CON1 is the power connector for external power supply. The lower pin in the picture right is the positive terminal. Alternatively jumper J1 can be closed and the board is supplied from the USB bus power.

For PC USB connection (and USB power supply, if desired) CON2 has to be mounted.

An external SMA-reverse antenna can has to be connected to CON3. Connecting the antenna through a 50 Ohms SMA cable is possible, too.

CON4 provides access to the ATmega128 ISP interface with standard Atmel 6-pin ISP pinout. Any common ISP interface can be connected here.

A standard SD-card can be inserted into CON5, which is internally connected to the ATmega128 ISP interface. The following table show the connected signals.

SD-Card	ChipSelect	Data In	Clock	Data Out	Card Detect	Write Protect
ATmega128	PB4	PB2	PB1	PB3	PD5	PD4

CON6 provides a SavvyBOX compatible header for stacking SavvyDISP into the iDwaRF-Box as display and key user interface. See <http://www.chip45.com/SavvyDISP> for details.

If no sophisticated user interface is required, alternatively two push buttons and one dual color LED can be mounted as SW1, SW2 and LED1. The LED red terminal is connected to ATmega128 PG3, whilst the green anode terminal is connected to PG4. Due to a layout bug, the two push buttons are not connected to any ATmega128 IO pin. If the buttons should be used, the lower left pad (see picture above) of each button has to be soldered to any of the IO signals available at CON6. Each opper left pad is GND, hence the buttons close to GND if pressed and the internal pullup resistor of the ATmega128 IO pin used has to be enabled.

## iDwaRF-NET FIRMWARE

The primary purpose of the iDwaRF-Net firmware is to provide a userfriendly software basis for implementing wireless multipoint-to-point (N:1) applications. In combination with the iDwaRF-168 programmable radio module, an easy-to-use wireless application platform is available. The user can concentrate on the actual application development without the need to immerse oneself in wireless protocol implementation details or to acquire fundamental HF design skills.

The iDwaRF-Net firmware is capable of servicing low data rate higher density node applications far beyond simple point-to-point (1:1) wireless connectivity. The protocol is designed for reliable 2-way communication between a wireless Hub and target Sensor or Actuator applications in N:1 networks. The iDwaRF-Net firmware encapsulates the complete wireless network protocol in convenient easy-to-use C-API functions.

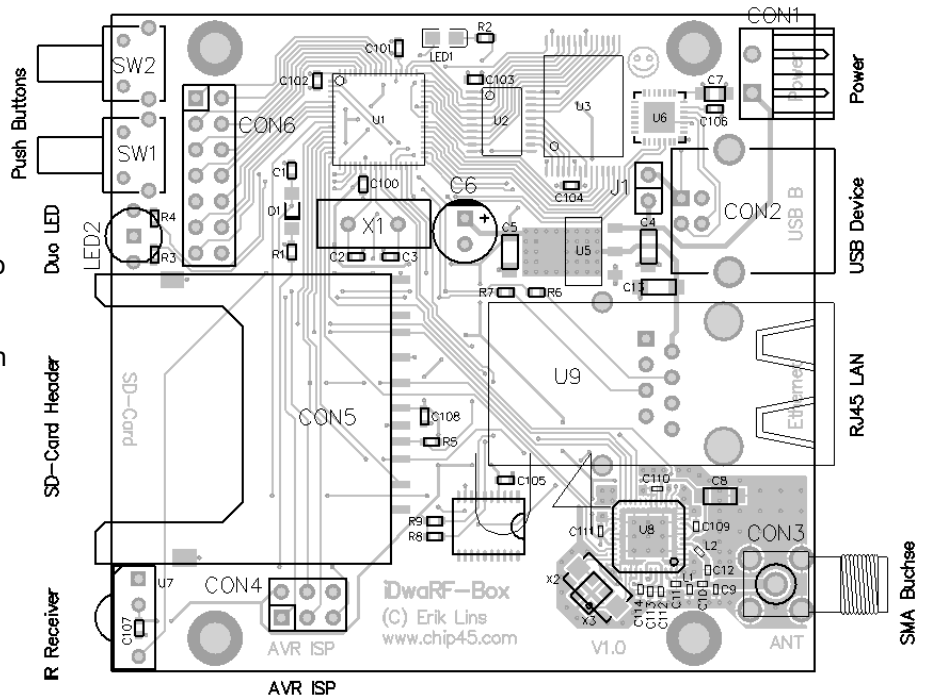
The iDwaRF-Net firmware is based on Cypress' WirelessUSB N:1 DVK (CY3635) software and was ported from Cypress PSoC architecture to the Atmel AVR ATmega168 microcontroller.



## ACCESSORIES

The iDwaRF-Box comes readily equipped with all components and connectors for standard PC USB connection or ethernet network connection. Just standard computer cables are required, which are available at <http://www.chip45.com/Cables>.

For in-circuit programming (ISP) of the ATmega128, an ISP adapter is required, which supports low-voltage (3.3V) targets. A suitable device is the CrispAVR-USB (<http://www.chip45.com/CrispAVR-USB>).



## OPERATING CHARACTERISTICS

Symbol	Parameter	Condition	Min	Typ	Max	Units	
Vcc	Supply Voltage	external power supply	4.75		16	V	
		USB bus powered		5.0		V	
Icc	Power Supply Current	Active 8MHz Vcc = 3.3V		t.b.d.		mA	
		USB bus active		+26		mA	
		radio RX (peak)				+58	mA
		radio TX (peak)				+69	mA
T	Operating Temperature (industrial temperature range on request)		-20		+70	°C	

## DESIGN AND HANDLING GUIDELINES

This module – just like any other semiconductor devices – is susceptible to damage by ESD. Suitable precautions should be taken when handling and transporting devices. The possible damage to devices depends on the circumstances of the handling and transporting, and the nature of the device. The extent of damage can vary from immediate functional or parametric malfunction to degradation of function or performance in use over time. Devices suspected of being affected should be replaced.

## DEVELOPMENT TOOLS

The free WinAVR C/C++ compiler toolset provides a powerful and stable development environment, which is nicely integrated into Atmel's AVR-Studio development suite. Please visit the following pages for more details:

- Atmel AVR Studio: [http://www.atmel.com/dyn/products/tools\\_card.asp?tool\\_id=2725](http://www.atmel.com/dyn/products/tools_card.asp?tool_id=2725)
- WinAVR compiler toolset: <http://winavr.sourceforge.net/>

## WHAT ELSE DO YOU NEED?

- An ISP adapter for in-system programming of the ATmega128, see <http://www.chip45.com/CrispAVR-USB> for a suitable device.
- The iDwaRF-Net firmware for an easy start into wireless sensor network development. See <http://www.chip45.com/iDwaRF-Net>.
- A development environment and compiler/assembler (see above DEVELOPMENT TOOLS). The iDwaRF-Net firmware requires the WinAVR compiler toolset.

## Declaration of Electro Magnetic Conformity of the CHIP45 „CrumbX128A3 V1.2“



CHIP45 embedded microcontroller modules (henceforce products) are designed for installation in electrical appliances or as dedicated evaluation boards (i.e.: for use as a test and prototype platform for hardware/software development) in laboratory environments.

### Caution:

CHIP45 products lacking protective enclosures are subject to damage by ESD and, hence, may only be unpacked, handled or operated in environments in which sufficient precautionary measures have been taken in respect to ESD-dangers. It is also necessary that only appropriately trained personnel (such as electricians, technicians and engineers) handle and/or operate these products. Moreover, CHIP45 products should not be operated without protection circuitry if connections to the product's pin header rows are longer than 3m.

CHIP45 products fulfill the norms of European Union's Directive for Electro Magnetic Conformity only in accordance to the descriptions and rules of usage indicated in this document (particularly in respect to the pin header row connectors, power connector and serial interface to a host-PC).

Implementation of CHIP45 products into target devices, as well as user modifications and extensions of CHIP45 products, is subject to renewed establishment of conformity to, and certification of, Electro Magnetic Directives. Users should ensure conformance following any modifications to the products as well as implementation of the products into target systems

## DISCLAIMER

In this manual are descriptions for copyrighted products that are not explicitly indicated as such. The absence of the trademark (™) and copyright (©) symbols does not imply that a product is not protected. Additionally, registered patents and trademarks are similarly not expressly indicated in this manual.

The information in this document has been carefully checked and is believed to be entirely reliable. However, chip45 GmbH & Co. KG assumes no responsibility for any inaccuracies. chip45 GmbH & Co. KG neither gives any guarantee nor accepts any liability whatsoever for consequential damages resulting from the use of this manual or its associated product. chip45 GmbH & Co. KG reserves the right to alter the information contained herein without prior notification and accepts no responsibility for any damages which might result.

Additionally, chip45 GmbH & Co. KG offers no guarantee nor accepts any liability for damages arising from the improper usage or improper installation of the hardware or software. chip45 GmbH & Co. KG further reserves the right to alter the layout and/or design of the hardware without prior notification and accepts no liability for doing so.

© Copyright 2010 chip45 GmbH & Co. KG, D-35440 Linden.

Rights - including those of translation, reprint, broadcast, photomechanical or similar reproduction and storage or processing in computer systems, in whole or in part - are reserved. No reproduction may occur without the express written consent from chip45 GmbH & Co. KG.

## CONTACT INFORMATION

Address:	chip45 GmbH & Co. KG Am Pfad 8 D-35440 Linden Germany
Ordering Information:	+49 (6403) 9253-53 <a href="mailto:info@chip45.com">info@chip45.com</a>
Technical Support:	+49 (6403) 9253-53 <a href="mailto:support@chip45.com">support@chip45.com</a>
Fax:	+49 (6403) 9253-50
Web Site:	<a href="http://www.chip45.com">http://www.chip45.com</a>