

Programmable OEM radio module for wireless applications based on Atmel's AVR ATmega328P processor.

BASIC SPECIFICATIONS

Module	Processor	RAM	EEPROM	Flash	Peripherals
iDwaRF-328 V1.2	ATmega328P	2kB SRAM	1kB EEPROM	32kB Flash	- CYWUSB6935 radio transceiver

High Performance / Low Power Consumption

- up to 8MHz operating frequency
- single 2.7-3.6V power supply
- 10µA power down current

Familiar Integrated AVR Peripherals

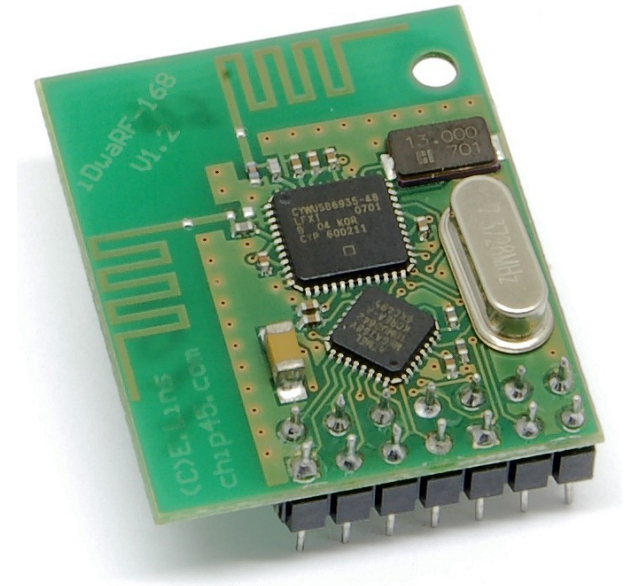
- up to 11 IO pins available
- two 8 bit, one 16 bit timer/counter
- three 8 bit, one 16 bit PWM channels
- input capture and output compare functions
- one programmable UARTs
- master/slave SPI interface
- two wire interface (I²C comp.)
- analog comparator
- four channel 10 bit ADC

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
- transmit and receive antenna in PCB
- +50m range
- data throughput up to 62.5kbit/s

Expansion Headers

- standard 2.54mm headers with all controller signals and signals from onboard peripherals

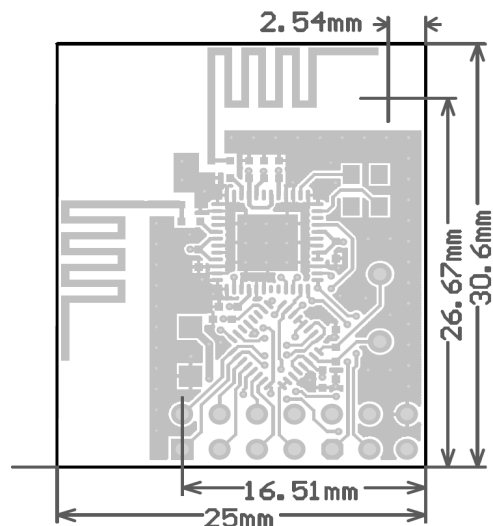
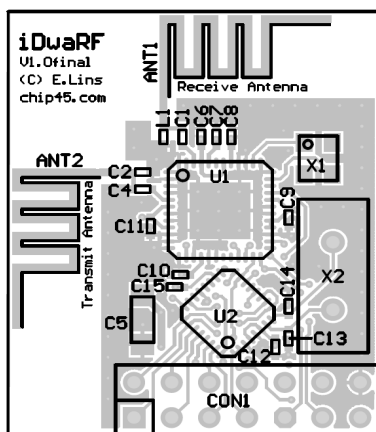


SCOPE OF DELIVERY

This module is being shipped without pin headers (THT components) preinstalled. A HC49 crystal comes with the module, the frequency can be selected at purchase.

PHYSICAL DIMENSIONS

Values are [mm] unless otherwise noted.

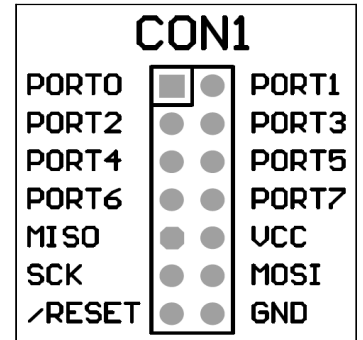


PIN CONFIGURATION

Connector CON1 provides eight IO signals of the ATmega328P as well as the four ISP signals plus VCC and GND. The ISP signals, VCC and GND matches the standard 6-pin ISP configuration recommended by Atmel, hence an ISP adapter can be connected easily.

The IO signals PORT0..7 are internally connected to more than eight ATmega168 pins. This either allows the usage of as many peripheral functions as possible with eight module pins, but care must be taken when configuring the ATmega168 IOs!

The following table shows the correlation between PORT pin and ATmega168 IO pin.



iDwaRF-328 PORT Pin	1. ATmega328 Pin (No.)	2. ATmega328 Pin (No.)	3. ATmega328 Pin (No.)
PORT0	OC0B / T1 / PD5 (9)	AIN1 / PD7 (11)	ADC3 / PC3 (26)
PORT1	OC0A / AIN0 / PD6	ADC2 / PC2 (25)	-
PORT2	SCL / ADC5 / PC5 (28)	-	-
PORT3	SDA / ADC4 / PC4 (27)	-	-
PORT4	TXD / PD1 (31)	-	-
PORT5	RXD / PD0 (30)	-	-
PORT6	INT1 / OC2B / PD3 (1)	XCK / T0 / PD4 (2)	-
PORT7	CLKO / ICP / PB0 (12)	OC1A / PB1 (13)	-

Note: Be sure not to enable shared ATmega328 pin functions only alternatively and not at the same time!

INTERNAL SIGNALS

The following IO signals of the ATmega328P are internally used in combination with the CYWUSB6935:

Signal	ATmega328 Pin	CYWUSB6935 Pin	Description
/WUSBRESET	PC1 (24)	/RESET (14)	Initiate a hardware reset of the radio chip.
/PD	PC0 (23)	/PD (33)	Force radio chip into power down state.
/INT0	PD2 (32)	IRQ (21)	Interrupt signal from radio chip to ATmega168.

FUSE BIT SETTINGS

The Fuse Bits of the ATmega328 should be set to the values shown in the table on the right. These values ensure proper operation of the iDwaRF-328 module with the 7.3728MHz crystal.

Extended Fusebyte	High Fusebyte	Low Fusebyte
0xF9	0xDF	0xFC

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-328 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 ATmega328 microcontroller.



ACCESSORIES

The iDwaRF-NodeBoard is a wireless sensor evaluation platform with iDwaRF-328 module, batterie clip and several sensor-like components like LED, push button, light sensor, battery monitoring and temperature sensor. Operating the NodeBoard is simplified by a downloadable precompiled version of the iDwaRF-Net firmware. Instead of the onboard sensor components own sensor or actuator extensions can be connected to an expansion header. See www.chip45.com/iDwaRF-NodeBoard for details.

To simplify the iDwaRF-Hub connection to a host PC, the iDwaRF-HubAdapter provides a simple USB to iDwaRF-168 interface. A standard USB cable can be used for PC connection and a USB driver (virtual COM port) simplifies access to the Hub from the PC application. For more information on the iDwaRF-HubAdapter see www.chip45.com/iDwaRF-HubAdapter.

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 4.18 (build 684): http://www.atmel.com/forms/software_download.asp?category_id=163&family_id=607&subfamily_id=760&fn=dl_AvrStudio4Setup.exe
- Atmel AVR Studio Service Pack 1 (build 692): http://www.atmel.com/dyn/resources/prod_documents/AVRStudio4.18SP1.exe
- Atmel AVR Studio Service Pack 3 (build 716): http://www.atmel.com/dyn/resources/prod_documents/AVRStudio4.18SP3.exe
- Atmel AVR Toolchain Installer: http://www.atmel.com/forms/software_download.asp?category_id=163&family_id=607&subfamily_id=760&fn=dl_avr-toolchain-installer-3.2.3.579-win32.win32.x86.exe

Note: Make sure to install both service pack 1 and service pack 3 for AVR Studio 4!

Always check

http://www.atmel.com/dyn/products/tools.asp?category_id=163&family_id=607&subfamily_id=760
for the latest version of AVR Studio or the AVR toolchain.

WHAT ELSE DO YOU NEED?

- To use the bootloader comfortably from a Windows PC application, see www.chip45.com/info/chip45boot2.html for the latest version of the chip45boot2 GUI application.
- If you prefer ISP programming, you need an ISP adapter for in-system programming of the MCU, see www.chip45.com/AVR-ISP-Programmer-Adapter for suitable devices.
- Windows and Mac users need the latest USB driver for the CP2102 USB UART converter (see CP2102 homepage at <https://www.silabs.com/products/interface/usbtouart/Pages/default.aspx>)
- A development environment and compiler/assembler (see above DEVELOPMENT TOOLS)

Declaration of Electro Magnetic Conformity of the CHIP45 „iDwaRF-328 V1.2“



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