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Embedded Wireless Solutions

RC188xDK

RC188xDK Demonstration Kit User Manual

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Demonstration kit Introduction

The Demonstration Kit (DK) is designed to make it easy for the user to evaluate the onboard module, develop an application and build prototypes very quickly. The kit includes two Demo Boards (DB). The demo board contains the selected module with embedded protocol and associated support circuits. The boards are delivered with a preprogrammed co-processor firmware and can easily be operated using a PC terminal emulator. For using the preprogrammed firmware, please see [1].

Your Demonstration Kit contains the following items:

Kit contents	
Item	*Number of articles*
Demo board w/radio module	2
Antenna, 50Ω quarter-wave monopole, SMA male connector	2
USB cable	2

This User Manual describes how to use the Demonstration Kit and provides detailed documentation for the Demonstration Board.

The Demonstration Kit includes what you need to evaluate the RF performance of the modules, develop your own application interfacing the modules, and can also be used to build a prototype of your application on the RC188x module. The demo kit is delivered in to variants:
- RC1880DK
- RC1885DK

Demo Board Introduction

The Demo Board contains an USB connector, USB to serial converter, LEDs, voltage regulator, power switch and programming/debug connector. All I/O signals are routed to holes at the edge suitable for 2.54 mm pitch pin headers.
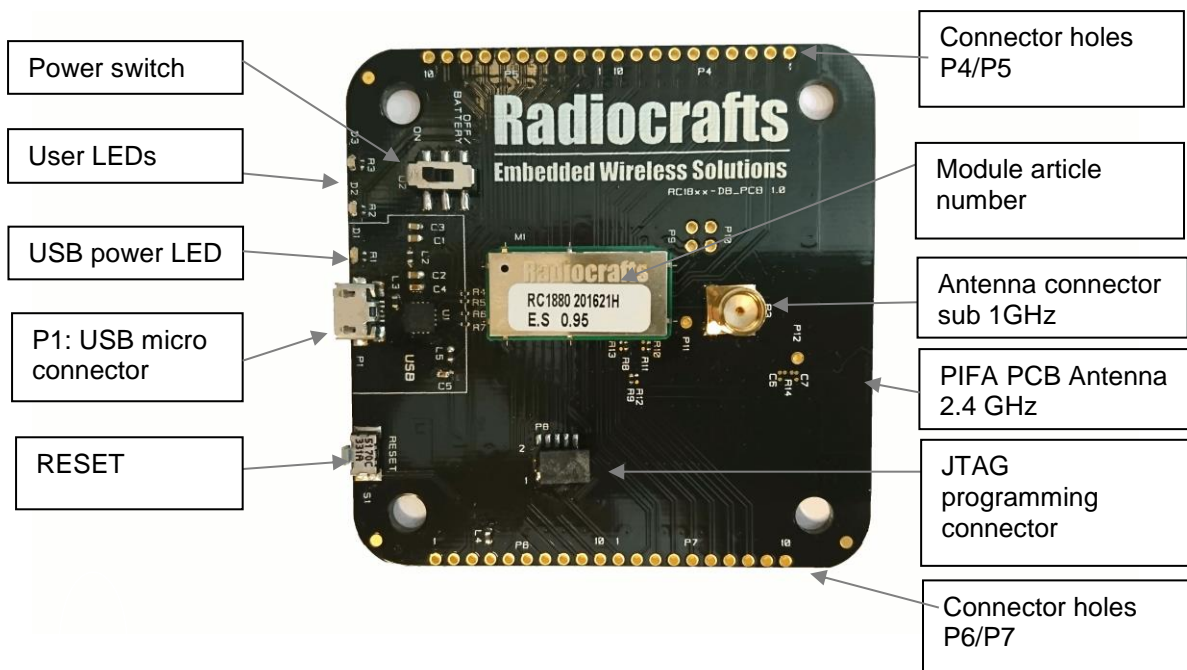

Figure 1: RC188x Demonstration Board

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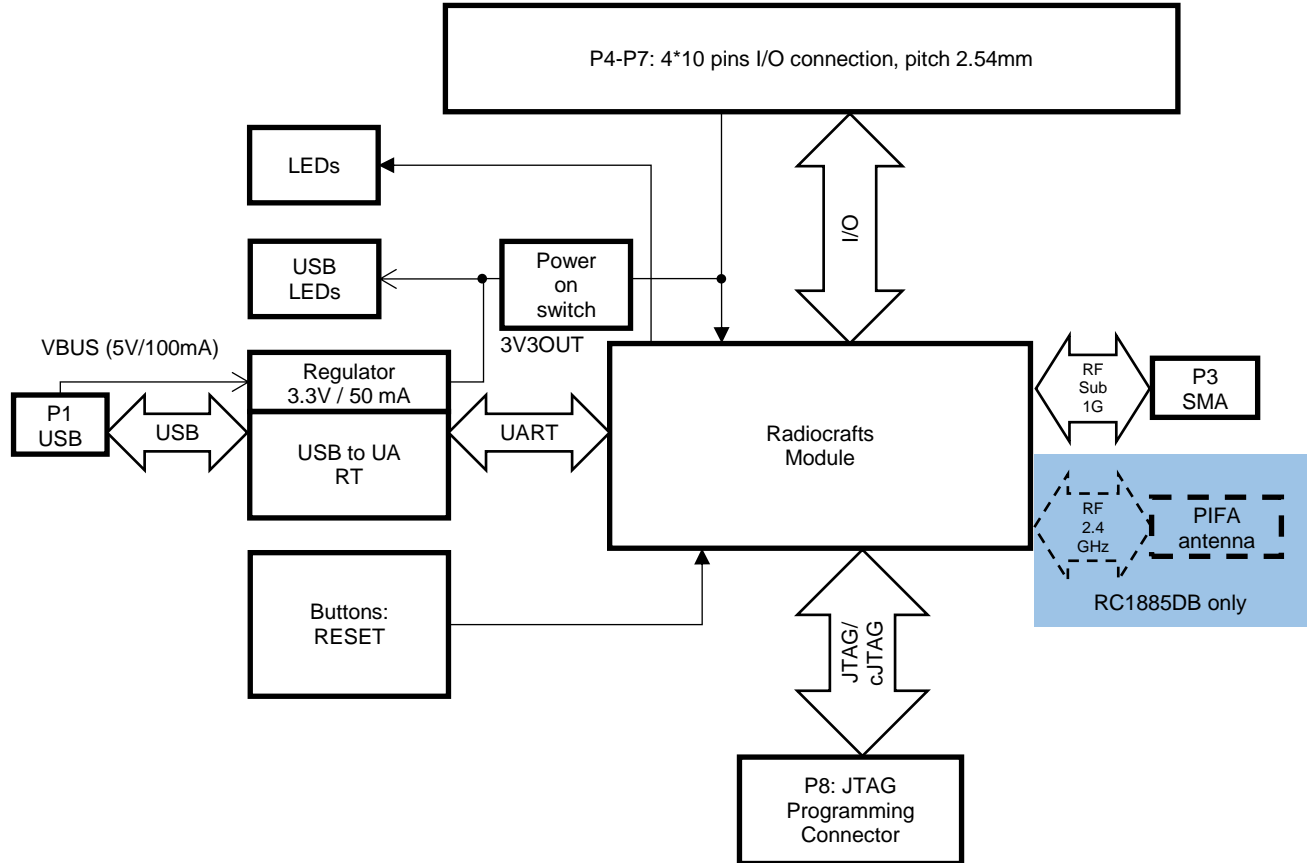
Block Diagram

Figure 2. Block schematic RC188xDB

I/O connection

All pins to the module are available through standard pin rows using a pitch distance of 100 mil (2.54 mm). These pins are connected to 4 x 10 pins holes named P4 to P7. The table below gives an overview of the edge connectors and their logical signals. Details on the RC188x pinning can be found in [2].

I/O connection				
Connector	**PIN**	**Signal**	**RC188x PIN**	**Note**
P4	1	GND		
	2	RX/TX	25	Not used
	3	RESET	26	
	4	DIO_1	30	
	5	DIO_2	31	
	6	DIO_3	32	
	7	DIO_4	33	
	8	DIO_5	34	
	9	DIO_6	35	
	10	DIO_7	36	
P5	1	DIO_8	37	
	2	DIO_9	38	
	3	DIO_10	39	
	4	DIO_11	40	
	5	DIO_12	41	
	6	DIO_13	42	
	7	DIO_14	2	
	8	DIO_15	3	
	9	DIO_18	4	
	10	GND		
P6	1	GND		
	2	DIO_19	5	TXD output (Connected to USB FTDI chip)
	3	DIO_20	6	RXD input (Connected to USB FTDI chip)
	4	VCC_EXTERN	27	Via EMI bead to RC1880
	5	DIO_21	8	
	6	DIO_22	9	
	7	DIO_23	10	
	8	DIO_24	11	
	9	TMSC	12	
	10	TCKC	13	
P7	1	DIO_16/TDO	14	
	2	DIO_17/TDI	15	
	3	DIO_25	16	
	4	DIO_26	17	
	5	DIO_27	18	
	6	DIO_28	19	Not connected for RC1885. Module pin 19-21 are RF port for 2.4 GHz.
	7	DIO_29	20	
	8	DIO_30	21	
	9			Not connected
	10	GND		

Prototyping with the RC188xDB

The RC188x demonstration board is well suited for prototyping/breadboarding. With all I/O pins easily accessible at the edge, connection to external boards can be made through board stacking with standard pin headers or cabled with standard 2.54 mm pitch cable.

With angled header mounted on I/O connector, the demonstration board can also be mounted vertically in other boards with 2.54mm pitch connectors.

Battery connectors on the bottom side are available for self powered demos. The demonstration board includes an option to mount a CR2032 battery holder on the bottom side. Suggested part:
Harwin S8211-46R, available at Digi-key part number 952-1735-2-ND or Mouser part number 855-S8211-46R. Battery clip is not default mounted.

The idea is that an external application specific circuitry/sensors etc easily can be connected to the demonstration board as a proof of concept for the final product.

The demonstration board is built to fit a commercially off the shelf enclosure named *Router Cube* from New Age Enclosure. Available at Mouser. The demonstration board is not delivered with enclosure. Machining for connectors/antenna is required.
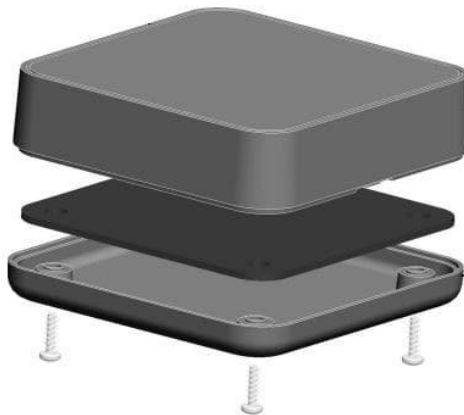

Figure 3 Optional enclosure from New Age Enclosures

RC188xDB PCB and Assembly layout

The PCB is a simple 2-layer board where Layer 2 is used as ground plane. The laminate used is standard FR-4 board material. The PCB is 1.6mm thick. Full resolution layout and assembly drawing are found in [5].
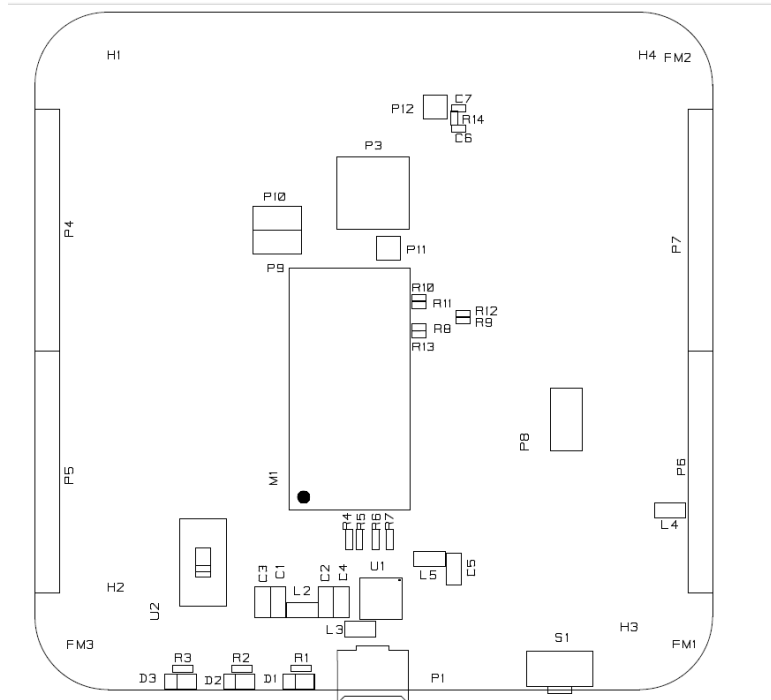

Figure 4. RC188x PCB component placement, top side

Programming/debug connector

Programming debug connector is 10 pins JTAG/ARM connector with 1.27mm pitch. Both normal JTAG and compact JTAG (cJTAG) is supported. For making custom specific firmware to run on the demonstration board please start with [4]
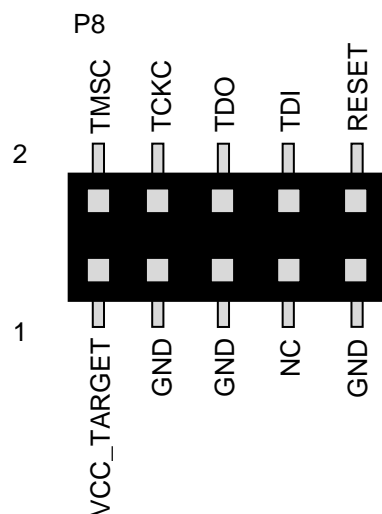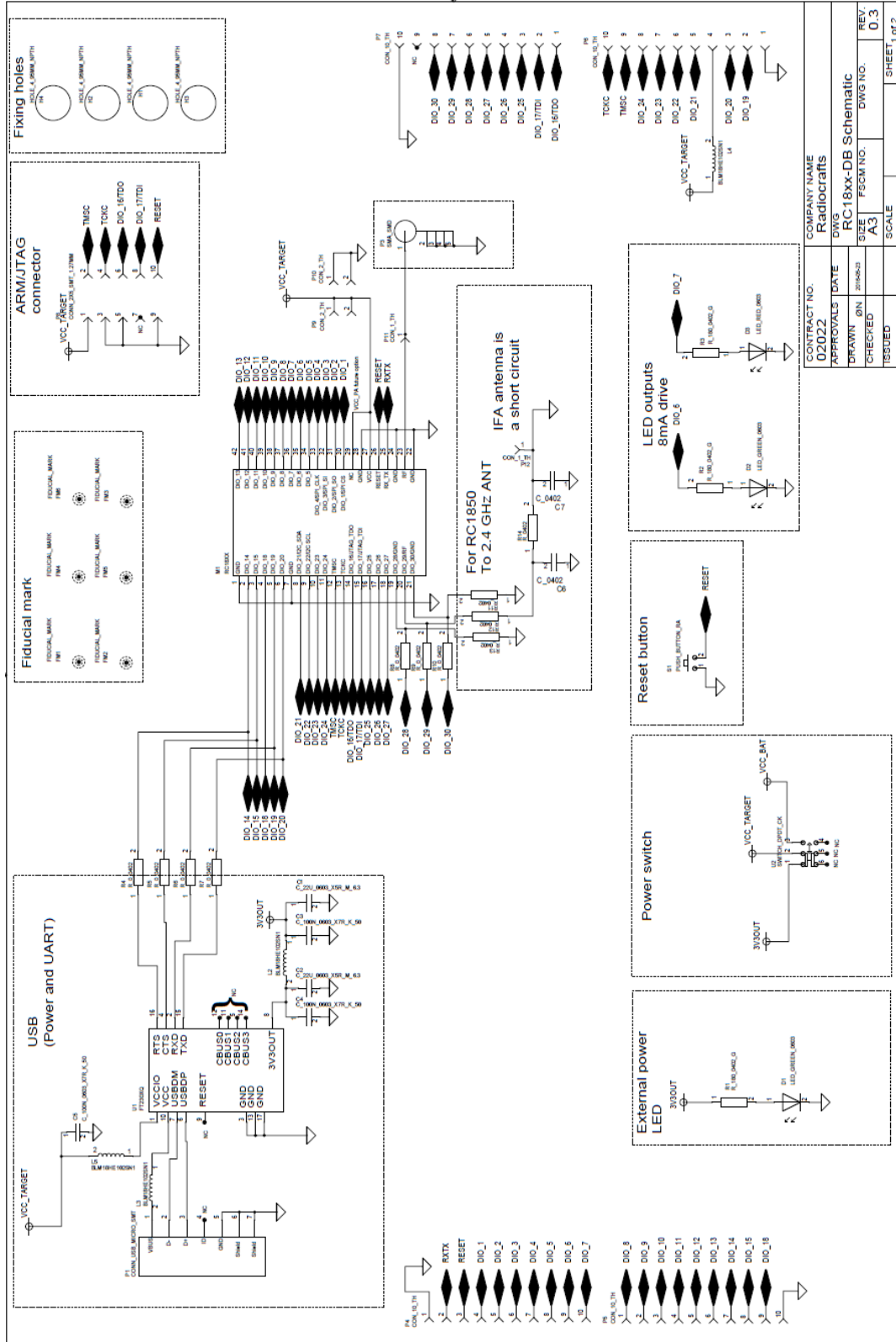

Figure 5. Programming connector P8

RC188xDB Circuit Diagram

The circuit diagram of RC188xDB is in figure 6. For better quality please see PDF in [5].

Figure 6: RC188xDB Circuit diagram

RC188xDB Bill of materials

The circuit diagram includes all components of RCxxxxDB-USB, but the Bill of Material is described which component are mounted. Details are listed in the following table Components not mounted are marked *DNM (Do Not Mount)* in the 'Quantity' column.

Bill of materials for RC1880DB			
Reference	*Quantity*	*Part number*	*Description*
L2-5	4	BLM18HE102SN1	EMI filter bead, 1000ohm@1GHz
P8	1	CONN_2X5_SMT_1.27MM	Connector 2x5 SMT with 1.27 mm spacing
P1	1	CONN_USB_MICRO_SMT	USB micro connector SMT
P4-7	*4(DNM)*	*CON_10_TH*	*Connector, 0.9mm pin*
P11-12	*2(DNM)*	*CON_1_TH*	*Connector, 0.9 mm pin*
P9-10	*2(DNM)*	*CON_2_TH*	*Connector, 0.9 mm pin*
P2	*1(DNM)*	*CR2032_HOLDER*	*HOLDER for coin cell*
C6-7;C9	*3(DNM)*	*C_0402*	*Capacitor, 0402, general*
C3-5	3	C_100N_0603_X7R_K_50	Capacitor, 0603
C8	1	C_220U_1206_X5R_M_6.3	Capacitor, 1206
C1-2	2	C_22U_0603_X5R_M_6.3	Capacitor, 0603
U1	1	FT230XQ	FTDI USB to UART
D1	1	LED_GREEN_0603_2mA	LED, green, 0603 size, I_forward 2mA
D2	1	LED_YELLOW_0603_2mA	LED, yellow, 0603 size, I_forward 2mA
D3	1	LED_BLUE_0603_2mA	LED, blue, 0603 size, I_forward 2mA
S1	1	PUSH_BUTTON_RA	Push button, SMD, Right angled
M1	1	RC1880	RC18xx variants
R11-14	*4(DNM)*	*R_0402*	*Resistor, 0402, general*
R4-10	7	R_0_0402	Resistor, 0402
R1;R3	2	R_330_0402_G	Resistor, 0402
R2	1	R_715_0402_G	Resistor, 0402
P3	1	SMA_SMD	Surface-mount SMA, straight
U2	1	SWITCH_DPDT_CK	Switch DPDT C&K

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Reference	Quantity	Part number	Description
Bill of materials for RC1885DB
L2-5	4	BLM18HE102SN1	EMI filter bead, 1000ohm@1GHz
P8	1	CONN_2X5_SMT_1.27MM	Connector 2x5 SMT with 1.27 mm spacing
P1	1	CONN_USB_MICRO_SMT	USB micro connector SMT
P4-7	*4(DNM)*	*CON_10_TH*	*Connector, 0.9mm pin*
P11-12	*2(DNM)*	*CON_1_TH*	*Connector, 0.9 mm pin*
P9-10	*2(DNM)*	*CON_2_TH*	*Connector, 0.9 mm pin*
P2	*1(DNM)*	*CR2032_HOLDER*	*HOLDER for coin cell*
C6-7;C9	*3(DNM)*	*C_0402*	*Capacitor, 0402, general*
C3-5	3	C_100N_0603_X7R_K_50	Capacitor, 0603
C8	1	C_220U_1206_X5R_M_6.3	Capacitor, 1206
C1-2	2	C_22U_0603_X5R_M_6.3	Capacitor, 0603
U1	1	FT230XQ	FTDI USB to UART
D1	1	LED_GREEN_0603_2mA	LED, green, 0603 size, I_forward 2mA
D2	1	LED_YELLOW_0603_2mA	LED, yellow, 0603 size, I_forward 2mA
D3	1	LED_BLUE_0603_2mA	LED, blue, 0603 size, I_forward 2mA
S1	1	PUSH_BUTTON_RA	Push button, SMD, Right angled
M1	1	RC1885	RC18xx variants
R8-10	*3(DNM)*	*R_0402*	*Resistor, 0402, general*
R4-7; RC11-14	8	R_0_0402	Resistor, 0402
R1;R3	2	R_330_0402_G	Resistor, 0402
R2	1	R_715_0402_G	Resistor, 0402
P3	1	SMA_SMD	Surface-mount SMA, straight
U2	1	SWITCH_DPDT_CK	Switch DPDT C&K

References

[1] RC1880DK Quick Start Guide
[2] RC1880 Data sheet
[3] RC1885 Data sheet
[4] RC188x Firmware development user manual
[5] RC18xxDB_web.zip

Document Revision History

Document Revision	Changes
1.0	First release
1.1	Made generic RC1880 → RC188x, and added info for RC1885

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