WirelessUSB™ PRoC™ Flash Programmable MCU + Radio

Features

- **Microcontroller with Mixed Signal Array**
  - — Cypress M8C CPU
  - — CPU clock up to 12 MHz
  - — Internal oscillator—no crystal required
  - — 8-KB Flash Program Memory with EEPROM emulation
  - — 512 Bytes SRAM Data Storage
  - — 4 Analog Blocks Provide:
    - 2 Comparators with DAC Refs
    - Two 8-bit 28-Channel ADCs
  - — 4 Digital Blocks Provide:
    - 8- to 32-bit Timers, Counters, and PWMs
    - CRC and PRS modules
    - Full-Duplex UART, SPI Master or Slave
    - Connectable to all GPIO pins
- **2.4-GHz DSSS radio transceiver**
  - — Operates in the unlicensed Industrial, Scientific and Medical (ISM) band (2.4 GHz –2.483 GHz).
  - — –95 dBm receive sensitivity
  - — Up to 0 dBm output power
  - — Range of up to 50 meters or more
  - — Data throughput of up to 62.5 kbits/sec
  - — Highly integrated low cost, minimal number of external components required
  - — DSSS baseband controller
  - — 13-MHz crystal clock
  - — Integrated 30-bit Manufacturing ID
- **Operating voltage from 2.7V to 3.6V**
- **Operating temperature from 0° to 70°C**
- **Offered in a small footprint 48 QFN**

Applications

- **Consumer/PC**
  - — Locator Alarms
  - — Presenter Tools
  - — Remote Controls
  - — Toys
  - — White Goods
- **Building/Home Automation**
  - — Climate Control
  - — Lighting Control
  - — Smart Appliances
  - — On-site Paging Systems
  - — Alarm and Security
- **Industrial Control**
  - — Inventory Management
  - — Factory Automation
  - — Data Acquisition
  - — Automatic Meter Reading (AMR)
- **Transportation**
  - — Diagnostics
  - — Remote Keyless Entry
- **Medical**

Functional Description

The CYWUSB6953 WirelessUSB™ PRoC™ (Programmable Radio System-on-Chip) device is the world's first low-cost Flash programmable microcontroller with an integrated 2.4-GHz radio transceiver.

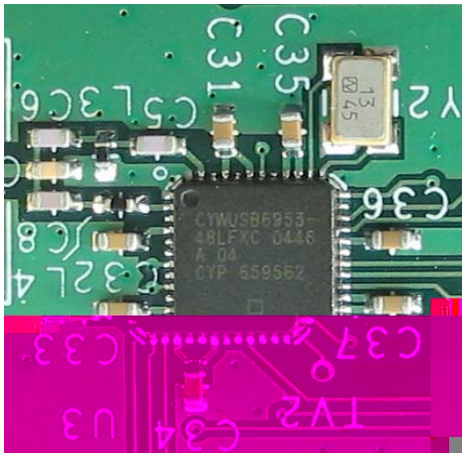
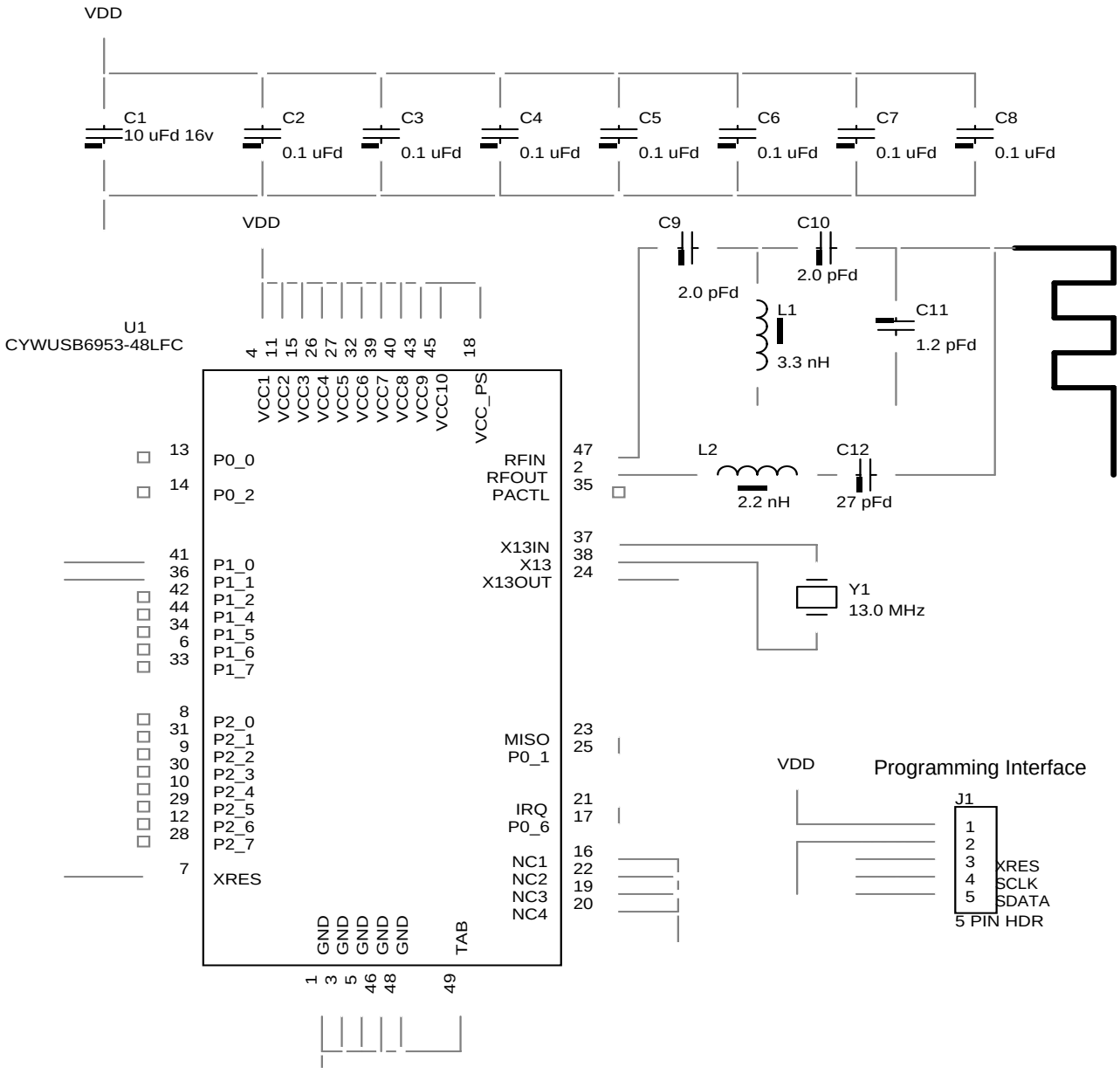


Figure 1. Typical Implementation

Pin Descriptions

Pin QFN	Name	Type	Die	Description
Analog RF				
47	RFIN		Radio	Modulated RF signal received.
2	RFOUT		Radio	Modulated RF signal to be transmitted
Crystal / PA Control				
38	X13	I	Radio	Crystal Input
37	X13IN	I	Radio	Crystal Input
24	X13OUT	O	Radio	Reference Clock Output
35	PACTL	IO	Radio	External Power Amplifier control. Pull-down or make output
Reserved				
23, 25	MISO	IO	Radio, MCU	Radio SPI Master In, Slave Out. Connect pins 23 and 25 on the application board
17, 21	IRQ	IO	Radio, MCU	Radio Interrupt. Connect pins 17 and 21 on the application board
Microcontroller Digital/Analog				
13	P0[0]	IO/M	MCU	Analog Column Mux Input
14	P0[2]	IO/M	MCU	Analog Column Mux Input
41	P1[0]	IO/M	MCU	I2C Serial Data (SDA)
36	P1[1]	IO/M	MCU	I2C Serial Clock (SCL)
42	P1[2]	IO/M	MCU	
44	P1[4]	IO/M	MCU	Optional External Clock Input (EXT-CLK)
34	P1[5]	IO/M	MCU	I2C Serial Data (SDA)
6	P1[6]	IO/M	MCU	
33	P1[7]	IO/M	MCU	I2C Serial Clock (SCL)
8	P2[0]	IO/M	MCU	Direct switched capacitor block input
31	P2[1]	IO/M	MCU	Direct switched capacitor block input
9	P2[2]	IO/M	MCU	Direct switched capacitor block input
30	P2[3]	IO/M	MCU	Direct switched capacitor block input
10	P2[4]	IO/M	MCU	
29	P2[5]	IO/M	MCU	
12	P2[6]	IO/M	MCU	
28	P2[7]	IO/M	MCU	
7	XRES	I	MCU	Active HIGH external reset with internal pull-down
Power and Ground				
4, 11, 15, 18, 26, 27, 32, 39, 40, 43, 45	V_{CC}			Supply Voltage
1, 3, 5, 46, 48	GND			Ground Connection
PADDLE	GND			Ground Connection
19, 20	RSVD			Connect to Ground
16, 22,	NC			No Connect


VDD
C1
10 uFd 16v
C2
0.1 uFd
C3
0.1 uFd
C4
0.1 uFd
C5
0.1 uFd
C6
0.1 uFd
C7
0.1 uFd
C8
0.1 uFd
VDD
U1
CYWUSB6953-48LFC
4 11 15 26 27 32 39 40 43 45 18
VCC1 VCC2 VCC3 VCC4 VCC5 VCC6 VCC7 VCC8 VCC9 VCC10 VCC_PS
13 P0_0
14 P0_2
41 P1_0
36 P1_1
42 P1_2
44 P1_4
34 P1_5
6 P1_6
33 P1_7
8 P2_0
31 P2_1
9 P2_2
30 P2_3
10 P2_4
29 P2_5
12 P2_6
28 P2_7
7 XRES
RFIN 47
RFOUT 2
PACTL 35
X13IN 37
X13 38
X13OUT 24
MISO P0_1 23 25
IRQ P0_6 21 17
NC1 16
NC2 22
NC3 19
NC4 20
GND GND GND GND GND TAB
1 3 5 46 48 49
C9
2.0 pFd
C10
2.0 pFd
L1
3.3 nH
C11
1.2 pFd
L2
2.2 nH
C12
27 pFd
Y1
13.0 MHz
VDD
Programming Interface
J1
1
2
3
4
5
XRES
SCLK
SDATA
5 PIN HDR

PRoC Absolute Maximum Ratings

Parameter	Description	Min.	Typ.	Max.	Unit
	Storage Temperature	–55		100	°C
	Ambient Temperature with power applied	0		70	°C
	Supply Voltage on V_{CC} relative to VSS	–0.3		3.9	V
	DC Voltage to logic inputs	–0.3		V_{CC} + 0.3	V
	DC Voltage applied to outputs in High-Z State	–0.3		V_{CC} + 0.3	V
	Maximum current into any port pin	–25		50	mA
	Static Discharge Voltage (RF)			500	V
	Static Discharge Voltage (Other)			1600	V
	Latch-up current			200	mA

PRoC Operating Conditions

Parameter	Description	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage	2.7	3	3.6	V
TA	Ambient temperature	0	25	70	°C

PRoC DC Electrical Characteristics

Parameter	Description	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage	2.7	3	3.6	V
I_{CC}	Supply Current (Radio in Power Down)		1.7	2	mA
RX I_{CC}	Supply Current Radio Receive		61.3		mA
TX I_{CC}	Supply Current Radio Transmit		74.7		mA
SYNTH SETTLE I_{CC}	Current Consumption with Synthesizer on, No Transmit or Receive		33.0		mA
IDLE I_{CC}	Supply Current Radio Idle		5		mA
I_{SLEEP}	Sleep Mode Supply Current		3	20	uA

Ordering Information

Part Number	Radio	Package Name	Package Type	Operating Range
CYWUSB6953-48LFC	Transceiver	48 QFN	48 Quad Flat Package	Commercial

Package Diagram

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