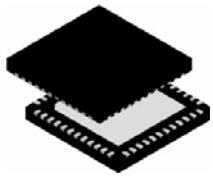
STM32W108C8

Optimized IEEE802.15.4 system-on-chip for remote control applications

Data brief

Features

- Exceptional radio performance
  - 2.4 Ghz IEEE 802.15.4 compliant RF transceiver
  - Normal mode link budget up to 102 dB; configurable up to 107 dB
  - –99 dBm normal RX sensitivity; configurable to –100 dBm (1% PER, 20 byte packet)
  - +3 dB normal mode output power; configurable up to +7 dBm
  - Robust WiFi and Bluetooth coexistence
  - Worldwide radio compliant reference design (ETSI, ARIB, FCC)
  - Low cost bill of material to implement cost effective solutions
- Low power consumption and advanced management
  - Receive current (with CPU): 27 mA
  - Transmit current (with CPU, +3 dBm TX): 31 mA
  - Low deep sleep current, with retained RAM data and GPIO states: 400/800 nA with/without sleep timer
  - Low frequency internal RC oscillator for low-power sleep timing
  - High frequency internal RC oscillator for fast (100 µs) processor start-up from sleep
- Full-featured system-on-chip
  - 32-bit ARM® Cortex™-M3 processor
  - 64-Kbyte Flash memory, 8-Kbyte RAM
  - AES128 encryption accelerator
  - Flexible ADC, SPI/UART/I^2C serial communications, and general-purpose timers
  - 24 highly configurable GPIOs with Schmitt trigger inputs



VFQFPN48
(7 x 7 mm)

- Innovative network and processor debug
  - Non-intrusive hardware packet trace
  - Serial wire/JTAG interface
  - Standard ARM debug capabilities: Flash patch & breakpoint; data watchpoint and trace; instrumentation trace macrocell
- Application flexibility
  - Single voltage operation: 2.1-3.6 V with internal 1.8 V and 1.25 V regulators
  - Optional 32.768 kHz crystal for higher timer accuracy
  - Low external component count with single 24 MHz crystal
  - Support for external power amplifier
  - IR generation capable
  - Pin and software compatibility with STM32W108xx series
  - Small 7x7 mm 48-pin VFQFPN package

Applications

- ZigBee RF4CE remote control and human interface devices
- 2.4 Ghz IEEE 802.15.4 MAC networks
- Consumer electronics devices
- Simple network RF control

1 Description

The STM32W108C8 is a fully integrated System-on-Chip that includes a 2.4 GHz IEEE 802.15.4-compliant transceiver, a 32-bit ARM® Cortex™-M3 microprocessor, Flash memory and RAM, and peripherals of use to designers of ZigBee-based systems.

The transceiver utilizes an efficient architecture that exceeds the dynamic range requirements imposed by the IEEE 802.15.4-2003 standard by over 15 dB. The integrated receive channel filtering allows for robust co-existence with other communication standards in the 2.4 GHz spectrum, such as IEEE 802.11 and Bluetooth. The integrated regulator, VCO, loop filter, and power amplifier keep the external component count low. An optional high performance radio mode (boost mode) is software-selectable to boost dynamic range.

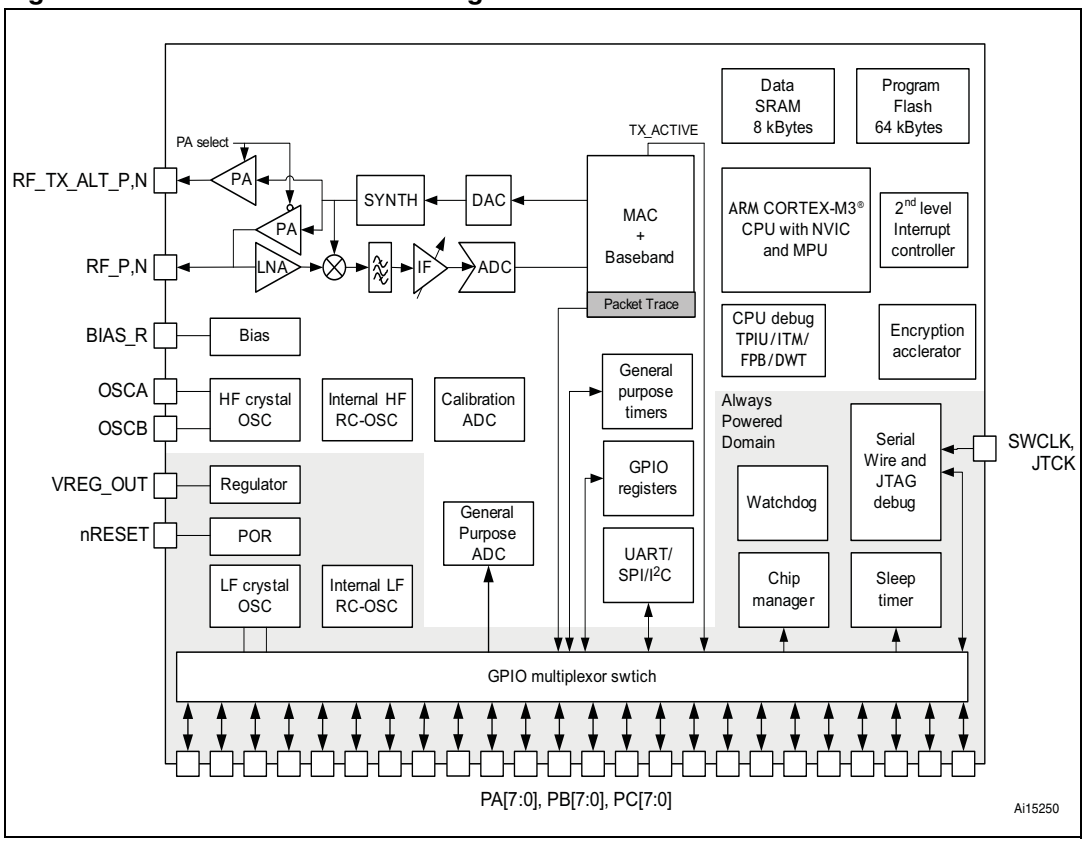
The integrated 32-bit ARM® Cortex™-M3 microprocessor is highly optimized for high performance, low power consumption, and efficient memory utilization. Including an integrated MPU, it supports two different modes of operation: Privileged mode and Unprivileged mode. This architecture could be used to separate the networking stack from the application code and prevent unwanted modification of restricted areas of memory and registers resulting in increased stability and reliability of deployed solutions.

The STM32W108C8 has 64 Kbytes of embedded Flash memory and 8 Kbytes of integrated RAM for data and program storage. The STM32W108C8 HAL software employs an effective wear-leveling algorithm that optimizes the lifetime of the embedded Flash.

To maintain the strict timing requirements imposed by the ZigBee and IEEE 802.15.4-2003 standards, the STM32W108C8 integrates a number of MAC functions into the hardware. The MAC hardware handles automatic ACK transmission and reception, automatic backoff delay, and clear channel assessment for transmission, as well as automatic filtering of received packets. A packet trace interface is also integrated with the MAC, allowing complete, non-intrusive capture of all packets to and from the STM32W108C8.

The STM32W108C8 offers a number of advanced power management features that enable long battery life. A high-frequency internal RC oscillator allows the processor core to begin code execution quickly upon waking. Various deep sleep modes are available with less than 1 µA power consumption while retaining RAM contents. To support user-defined applications, on-chip peripherals include UART, SPI, I^2C, ADC and general-purpose timers, as well as up to 24 GPIOs. Additionally, an integrated voltage regulator, power-on-reset circuit, and sleep timer are available.

Figure 1. STM32W108C8 block diagram



1.1 Development tools

The STM32W108C8 implements both the ARM Serial Wire and JTAG debug interfaces. These interfaces provide real time, non-intrusive programming and debugging capabilities. Serial Wire and JTAG provide the same functionality, but are mutually exclusive. The Serial Wire interface uses two pins; the JTAG interface uses five. Serial Wire is preferred, since it uses fewer pins.

The STM32W108C8 also integrates the standard ARM system debug components: Flash patch and breakpoint (FPB), Data watchpoint and trace (DWT), and Instrumentation trace macrocell (DWT).

2 Package characteristics

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Figure 2. VFQFPN48 7x7mm package outline

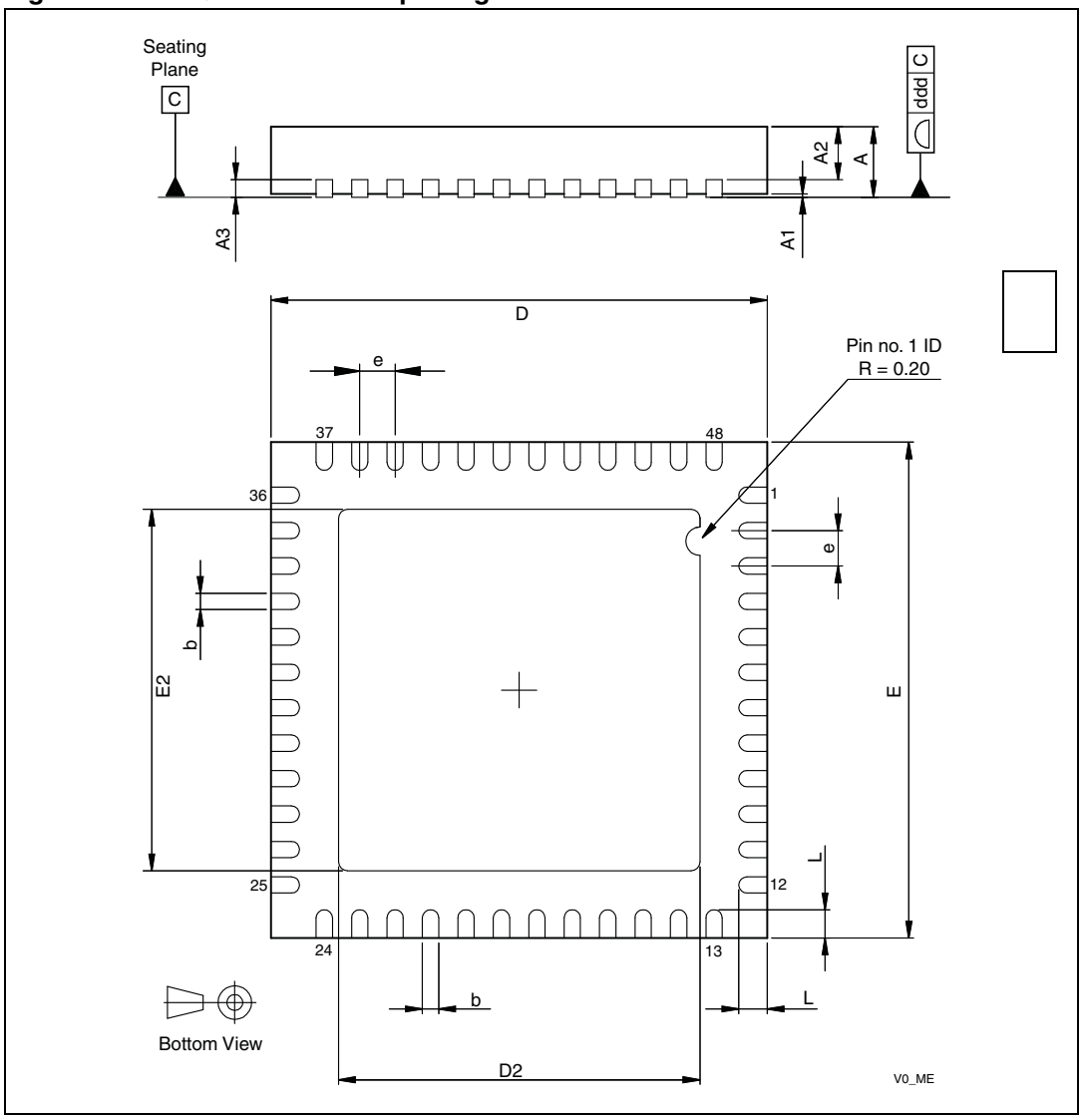


Table 1. VFQFPN48 7x7mm package mechanical data

Symbol	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.800	0.900	1.000	0.0315	0.0354	0.0394
A1		0.020	0.050		0.0008	0.0020
A2		0.650	1.000		0.0256	0.0394
A3		0.250			0.0098	
b	0.180	0.230	0.300	0.0071	0.0091	0.0118
D	6.850	7.000	7.150	0.2697	0.2756	0.2815
D2	2.250	4.700	5.250	0.0886	0.1850	0.2067
E	6.850	7.000	7.150	0.2697	0.2756	0.2815
E2	2.250	4.700	5.250	0.0886	0.1850	0.2067
e	0.450	0.500	0.550	0.0177	0.0197	0.0217
L	0.300	0.400	0.500	0.0118	0.0157	0.0197
ddd			0.080			0.0031

1. Values in inches are converted from mm and rounded to 4 decimal digits.

3 Ordering information scheme

Example: STM32 W 108 C 8 U 6 x

Device family
STM32 = ARM-based 32-bit microcontroller

Product type
W = wireless system-on-chip

Sub-family
108 = IEEE 802.15.4 specification

Pin count
C = 48 pins

Code size
8 = 64 Kbytes of Flash memory

Package
U = QFN

Temperature range
6 = –40 °C to +85 °C

Firmware version
“Blank” = Open platform
3 = RF4CE stack
4 = IEEE 802.15.4 media access control

For a list of available options (speed, package, etc.) or for further information on any aspect of this device, please contact your nearest ST sales office.

4 Revision history

Table 2. Document revision history

Date	Revision	Changes
03-Dec-2010	1	Initial release.

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