UM0458
User manual

STEVAL-IFS009V1
extension for SN250 network processor

Introduction

This user manual describes the STEVAL-IFS009V1 ZigBee® extension hardware. It includes a block diagram, schematics of the extension, and a bill of material and assembly instructions.

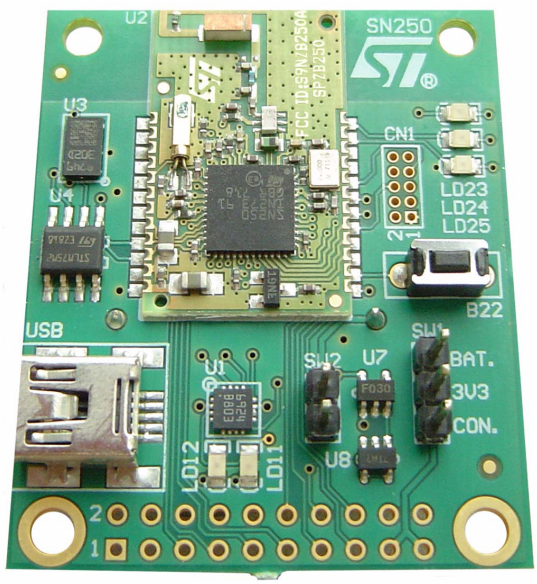
The STEVAL-IFS009V1 operates in standalone mode. Alternatively it can be used as a SN250 ZigBee interface with an application using an STR9 dongle.

The SN250 integrates a 2.4 GHz IEEE802.15.4-compliant transceiver with a 16-bit XAP2b microprocessor. It features embedded Flash and RAM memories, as well as peripherals useful to design ZigBee-based applications.

The extension board is supplied with a demonstration firmware loaded in the SN250 Flash memory. The firmware source code is not provided by STMicroelectronics.

The STEVAL-IFS009V1 is delivered with a CD-ROM containing technical documentation. This information is also available on ww.st.com/zigbee.

Figure 1. STEVAL-IFS009V1 extension board



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1 Block diagram

The main features of the extension board are the following:

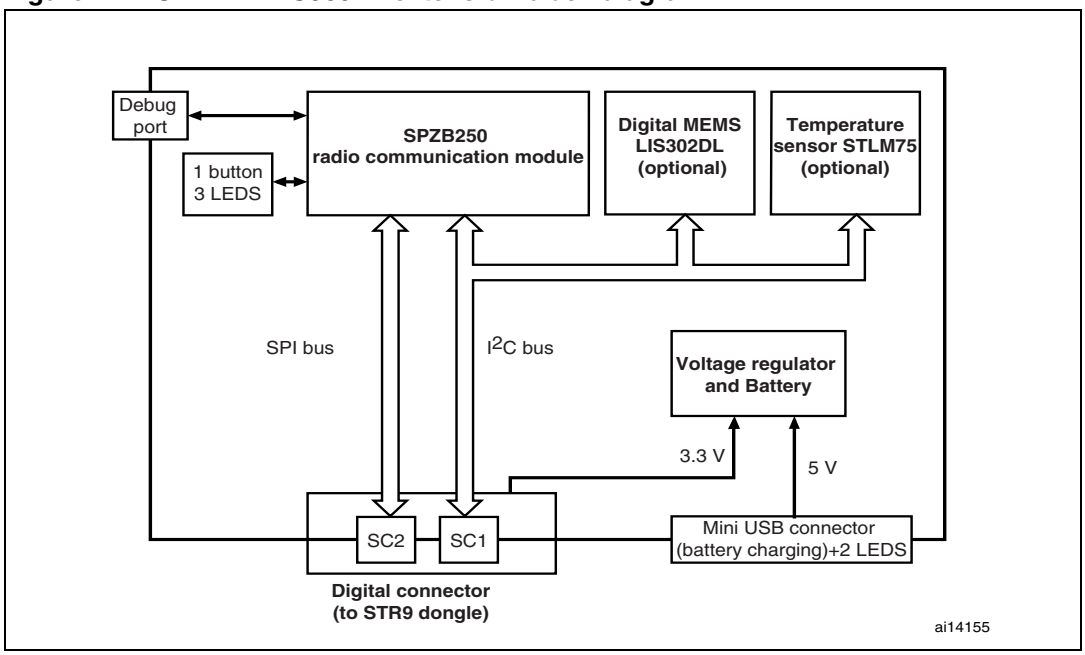
- SPZB250 radio communication module based on SN250 ZigBee network processor
- LIS302DL Digital MEMS in LGA14 package (optional)

  It can be accessed by the ZigBee network processor through an I^2C bus.
- STLM75 temperature sensor or compatible device in SO8 package (optional). It is connected to the ZigBee network processor through an I^2C bus.
- Digital interfaces: one I^2C and one SPI interface which can be used indifferently by the SN250 ZigBee network processor to interface with the STR9 dongle
- Supply voltage

  The extension board can be supplied externally from the STR9 dongle or internally by an on-board Ion-Li battery. The battery has a capacity of 65 mA hours which allows approximately one hour of operation. It is charged through a mini USB connector. 2 LEDs can be used to monitor the charging:
  - Red LED: charge in progress
  - Green LED: charge completed
- 1 button connected to the SN250 ZigBee network processor WAKE_UP input
- 3 LEDs connected to the SN250 ZigBee network processor:
  - Yellow LED: device connected
  - Green LED: transmission ongoing
  - Red LED: general purpose
- A debug port

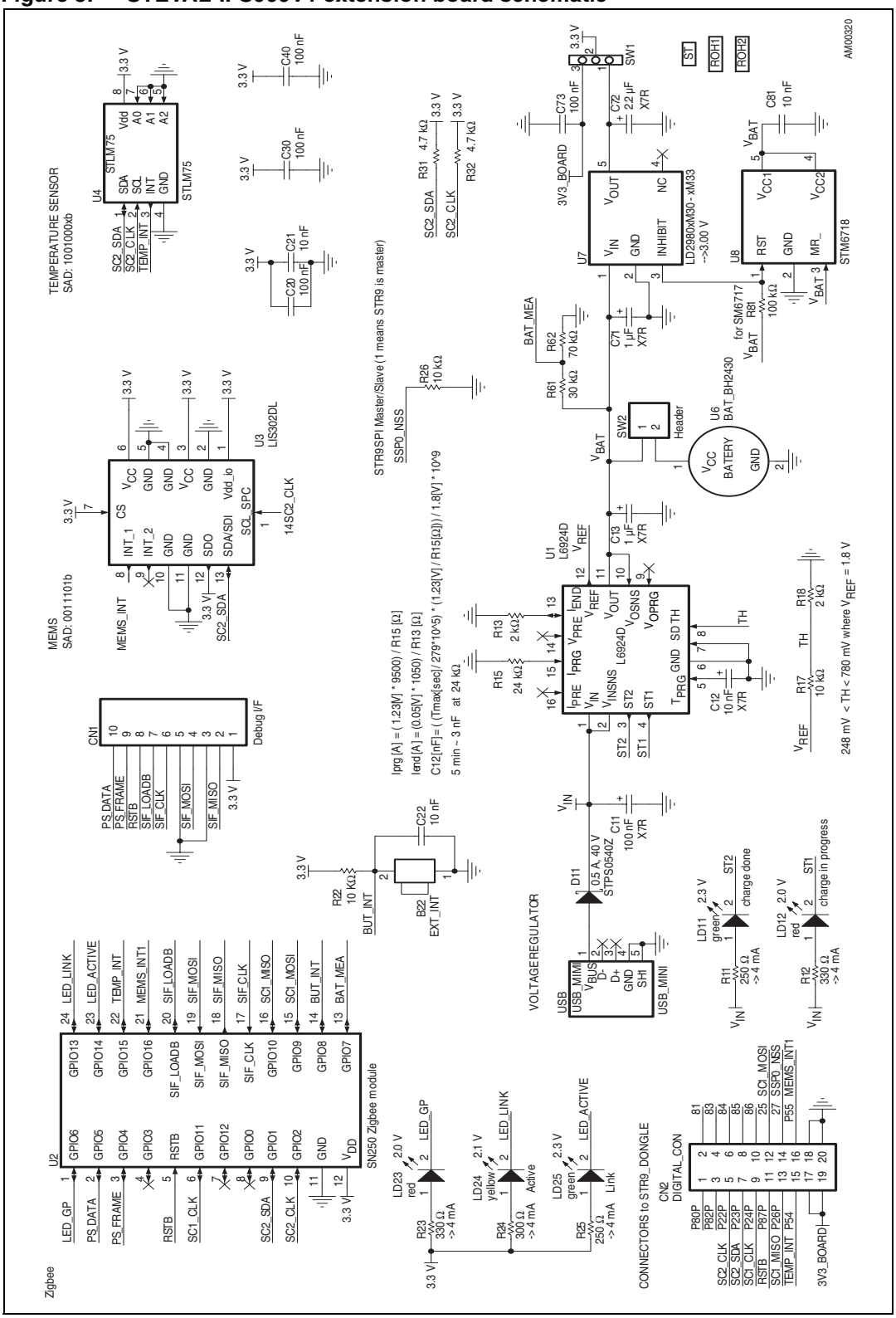
Figure 2 shows the STEVAL-IFS009V1 extension block diagram.

Figure 2. STEVAL-IFS009V1 extension block diagram



1.1 Schematics

Figure 3. STEVAL-IFS009V1 extension board schematic



1.2 PCB layout

Figure 4. Top view

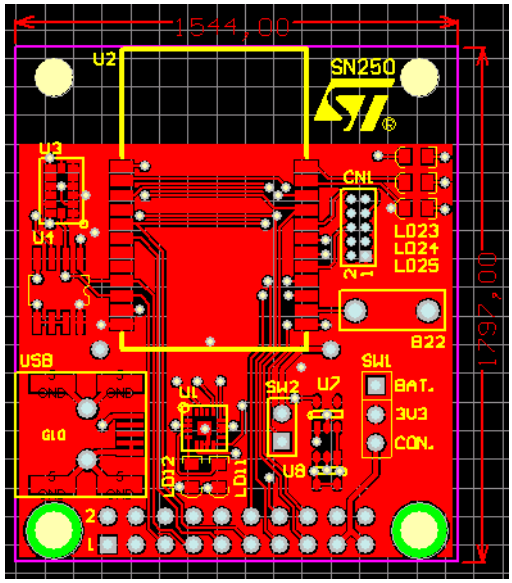
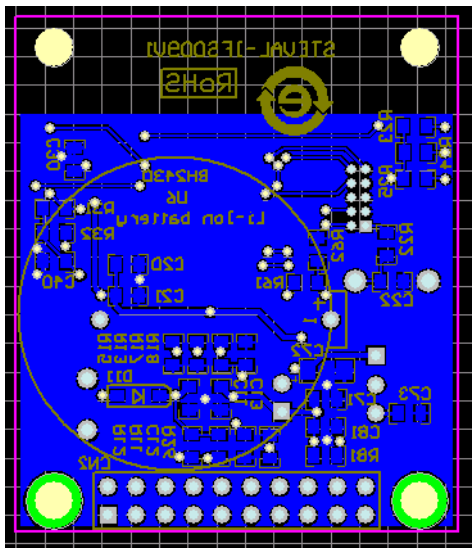


Figure 5. Bottom view



1.3 Bill of material

Table 1 shows the bill of material for the STEVAL-IFS009V1 extension board.

Table 1. Bill of material

Designator	Footprint	Description	Assembled	Order code
U1	L6924D	L6924D	Yes	ST: L6924D
U2	SN250_ST_module - duplicate	SN250 ZigBee module	Yes	ST: SPZB250
U3	LGA14AD	LIS302DL	Yes	ST: LIS302DL
U4	SO8	STLM75	Yes	ST: STLM75
U6	BH2430	BAT_BH2430	Yes	GM: BH2430 (holder) and B-LIR2430 (battery)
U7	SOT23-5L	LD2980Cx30	Yes	ST: LD2980Cx30
U8	SOT23-5L	STM6718	Yes	ST: STM6718T
USB	USB_MINI	USB_MINI	Yes	GM: USB MINI B F SMD (832-177)
CN1	Header 2X5	Debug I/F	Yes	Samtec: FTSH-114-04-F-DV
CN2	Header 2X10	DIGITAL_CON	No	GM: BL220G
SW1	Header 1x3	Power switch	Yes	GM: S1G20
SW2	Header1x2	Battery switch	Yes	GM: S1G20
B22	Button_DT2112C	EXT_INT	Yes	GM: P-DT2112C
D11	SOD-123	STPS0540Z	Yes	ST: STPS0540Z
LD11, LD25	D0805	green	Yes	GM: 960-023
LD12, LD23	D0805	red	Yes	GM: 960-024
LD24	D0805	yellow	Yes	GM: 960-025
C12, C21, C22, C81	0805	10 nF	Yes	Farnell: 422-7153 (X7R)
C11, C20, C30, C40, C73	0805	100 nF	Yes	Farnell: 422-7189 (X7R)
C13, C71	0805	1 µF	Yes	Farnell: 422-7086 (X7R)
C72	1206	2.2 µF	Yes	Farnell: 422-7323 (X7R)
R11, R25	0805	250 Ω	Yes	GM: R0805-250R
R24	0805	300 Ω	Yes	GM: R0805-300R
R12, R23	0805	330 Ω	Yes	GM: R0805-330R
R13, R18	0805	2 kΩ	Yes	GM: R0805-2k
R31, R32	0805	4.7 kΩ	Yes	GM: R0805-4k7
R17, R22, R26	0805	10 kΩ	Yes	GM: R0805-10k
R15	0805	24 kΩ	Yes	GM: R0805-24k

Table 1. Bill of material (continued)

Designator	Footprint	Description	Assembled	Order code
R61	0805	30 kΩ	Yes	GM: R0805-30k
R62	0805	70 kΩ	Yes	GM: R0805-70k
R81	0805	100 kΩ	No	GM: R0805-100k

1.4 Connection of STR9 ZigBee extension to the STR9 dongle

This section provides additional information on how to connect the STR9 ZigBee extension board to the STR9 dongle (see *Figure 3*).

- I^2C bus
  - The STR912, SN250, LIS302DL (MEMS), and STLM75 temperature sensor communicate through the I^2C bus. The SN250 is connected to the STR9 dongle through SC1 I^2C connector.
  - The master can be either the dongle STR912 (STR912FAW34, STR912FAW42 and STR912FAW44) or the SN250 ZigBee network processor.
- SPI bus
  - The SPI bus is shared between the STR12 and SN250. The SN250 is connected to the STR9 dongle through SC2 SPI connector.
  - The dongle STR912 is configured to operate as a master by connecting the input SSP0_NSS of the SPI bus to V_{DDQ} through the pull-up resistor R26.
  - The SC2_SEL input is used to select the ZigBee module. It is connected to P80 pin of the STR9 dongle.
- Power supply
  - The board can be supplied directly by the STR9 dongle, please refer to *Section 1.5.3*.

1.5 Board supply

1.5.1 Supply from battery

Board is typically supplied from battery. Li-Ion LIR2430 rechargable battery is recommended. Capacity of 65 mAh gets to ZigBee board several hours of life. In the battery operation mode SW1 is closed and SW2 is close on pins 3V3 and BAT. Have in mind there is a protection against total battery discharge. When the battery voltage goes below 3.075 V (typ.) the voltage supervisor activates the inhibit pin of voltage regulator.

1.5.2 Battery charging

Charging process starts automatically when USB (mini-USB) is connected. Let's remind there are no data on the USB, it's used just for charging. SW2 must be close during charging.

When charging red led LD12 is turned-on and green led LD11 turned-off.

When charged/done the green led LD11 turned-on and red led LD12 is turned-off.

When error occurs, e.g. battery is missing, both leds red LD12 and green LD11 are turned-on.

It's good to keep SW1 open, to be able to charge the battery. It is possible to charge battery even the SW1 is closed (board in operation mode) but the charging process starts again and again.

1.5.3 Supply directly from pins

It's possible to charge the board directly from the pins of CN2. In this case the SW1 is closing 3V3 and CON. pins. This connector is compatible with STR9_DONGLE (STEVAL-IFS0001V1). Please refer to UM0282.

1.6 Board storage recommendation

When not using the board for longer time, It's strongly recommended to remove or disconnect (SW2 open) the battery from the board.

1.7 Measurements

1.7.1 Battery measurement

It is possible to use SW2 for measurement: battery voltage or current (closing by ampermeter).

1.7.2 Output voltage measurement

It is possible to use SW1 to measure final voltage outcoming from the voltage regulator.

1.8 Firmware

Firmware is pre-flashed. For your own application development you need to have a tool. STMicroelectronics offers: www.st.com/stonline/products/literature/bd/13503/sndev-250.htm.

Note: The demonstration firmware embedded in the SN250 Flash memory manages the communications with the STML75 and the MEMS through the I^2C interface. The user can interact with the SN250 through its UART which is connected to CN2. SPI communications are not supported. However the demonstration firmware can be modified and reprogrammed into the Flash memory.

2 Revision history

Table 2. Document revision history

Date	Revision	Changes
13-Nov-2007	1	Initial release.
18-Apr-2008	2	Changed title to “STEVAL-IFS009V1, extension for SN250 network processor“. Updated *Section : Introduction*, *Figure 1: STEVAL-IFS009V1 extension board*, *Figure 3: STEVAL-IFS009V1 extension board schematic*, *Figure 4: Top view*, *Figure 5: Bottom view*, and *Table 1: Bill of material*. Added *Note:* in *Section 1.4: Connection of STR9 ZigBee extension to the STR9 dongle*.
09-Oct-2008	3	Updated *Figure 1*, *Figure 3*, *Table 1* (U8 - ST: STM6718 changed to ST: STM6718T, *Section 1.4*, added *Section 1.5* to *Section 1.8*., moved *Note:* from *Section 1.4* into *Section 1.8*,

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