ST-NXP Wireless

IMPORTANT NOTICE

Dear customer,

As from August 2nd 2008, the wireless operations of STMicroelectronics have moved to a new company, ST-NXP Wireless.

As a result, the following changes are applicable to the attached document.

- **Company name - STMicroelectronics NV** is replaced with **ST-NXP Wireless.**
- **Copyright** - the copyright notice at the bottom of the last page "© STMicroelectronics 200x - All rights reserved", shall now read: "© ST-NXP Wireless 200x - All rights reserved".
- **Web site** - http://www.st.com is replaced with http://www.stnwireless.com
- **Contact information** - the list of sales offices is found at http://www.stnwireless.com under Contacts.

If you have any questions related to the document, please contact our nearest sales office. Thank you for your cooperation and understanding.

ST-NXP Wireless

STLC2690

Bluetooth V2.1 and FM RDS transceiver system-on-chip

Data Brief

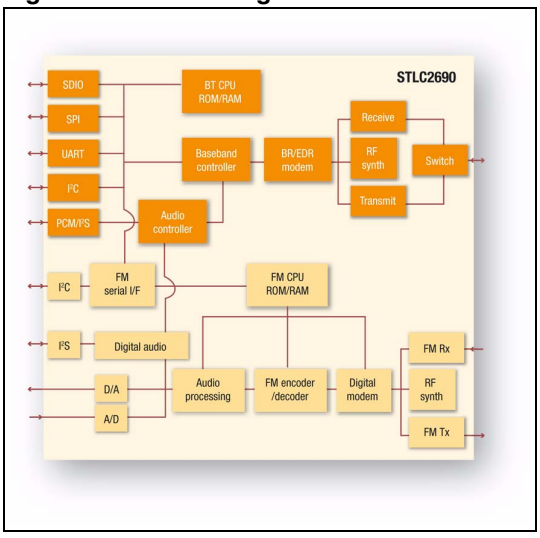
Features

- Addition of the FM transmit functionality to Bluetooth and FM radio combo system-on-chip
  - Send music content stored on a portable device to any in-car or home FM tuner system
  - SureTune™ technology to select the optimal FM transmit frequency
- Simultaneous operation of Bluetooth and FM
- Very low power consumption for battery powered devices
  - Designed in ST's low power 65 nm RFCMOS technology
- Increased link budget for both Bluetooth and FM to improve the connection stability
- Small PCB footprint
  - WLCSP package, 0.6 mm height and 0.4 mm pitch
  - Only 10 external components
  - Easy layout
  - Require PCB footprint < 36 mm^2
- Easy integration on mobile platforms
  - Support for low power and system reference clocks (up to 52 MHz) of the major cellular basebands
  - 1.8 V supply voltage
  - Several analog and digital audio and data interfaces supported
  - Reference design, development tools and guidelines

Description

The STLC2690 combines Bluetooth V2.1 + EDR and FM R(B)DS transceiver functionality on a single chip designed in ST low power 65 nm RFCMOS process. The device is fully optimized for mobile phones, smart phones, PDAs and portable multimedia player applications. The required board space has been minimized. Power consumption levels are optimized for battery powered devices and the high integration level allows a cost effective solution. The low external BOM count allows easy integration of the STLC2690 into products, enabling short time to market.

Figure 1. Block diagram



1 Overview

1.1 Bluetooth™ features

- Bluetooth™ V2.1+EDR compliant
  - Point-to-point, point-to-multi-point (up to 7 slaves) and scatternet capability
  - ACL and SCO links
  - Extended SCO (eSCO) links
  - Faster connection
- HW support for packet types
  - ACL:
    DM1, DM3, DM5, DH1, DH3, DH5, 2-DH1, 2-DH3, 2-DH5, 3-DH1, 3-DH3, 3-DH5
  - SCO: HV1, HV3 and DV
  - eSCO: EV3, EV4, EV5, 2-EV3, 2-EV5, 3-EV3, 3-EV5
- Wide band speech support
- Adaptive Frequency Hopping (AFH)
- Channel Quality Driven Data Rate (CQDDR)
- Transmit power
  - Power Class 2 and Power Class 1.5 with integrated PA
  - Class 1.5 typical output power above 10 dBm
  - Programmable output power
  - Power Class 1 compatible
- Sensitivity down to -90 dBm
- HCI
  - HCI H4 transport layer on UART and SPI
  - Bluetooth Type A transport layer on SDIO
  - HCI proprietary commands (for example peripherals control)
  - Single HCI command for patch/upgrade download
  - (e)SCO over HCI
- Pitch-Period Error Concealment (PPEC) for improved voice quality
- Efficient and flexible support for WLAN coexistence scenarios
- Low power consumption
  - Ultra low power architecture with 3 different low-power levels
  - Deep sleep modes, including Host-power saving feature
  - Dual wake-up mechanism
  - Current consumption with 1.8 V supply:
    Sniff mode (1.28 sec.): 75 µA
    eSCO: 2-EV3: 5.1 mA
    ACL: 3-DH5: 27 mA

- Communication interfaces
  - UART up to 4 MHz
  - SPI interface
  - SDIO interface up to 25 MHz
  - PCM interface/I2S interface
  - I2C interface
  - Up to 16 additional flexibly programmable GPIOs
  - External interrupts possible through the GPIOs
- On-chip memory organization
  - On chip RAM, including provision for patches
  - On chip ROM, preloaded with SW up to HCI
- Ciphering support up to 128 bits key

1.2 FM transceiver features

- Worldwide FM band (65 - 108 MHz) including Russian band
- RDS/RBDS processor
- On-chip demodulator, modulator and packet decoding and encoding
- World best, State of the art receiver sensitivity of - 2.5 dBµV
- Excellent receiver selectivity for audio and RDS
- Adaptive signal processing, to provide best audio quality versus received signal quality or in-band blockers.
- Autonomous ultra fast checking for alternate frequencies
- Fast search tuning
- Digital volume control and equalizer
- High output power linear transmitter
- Programmable transmit output level to comply with FCC and ETSI requirements
- Embedded filtering for coexistence in mobile handset
- Programmable AGC for optimized frequency deviation
- SureTune^{TM} technology to automatically select the optimal transmit frequency
- On-chip controller with ROM/RAM
- Analog and digital audio output and input
- Typical current consumption FM rx: 15 mA (1.8 V supply)
- Control interface: I2C or HCI
- High level API: easy software integration

1.3 Description

The STLC2690 is a system-on-chip Bluetooth V2.1 + EDR transceiver and FM R(B)DS transceiver designed in ST low-power 65 nm RFCMOS process. The chip is offered in a Wafer Level Chip Scale Package (WLCSP) of 0.6 mm height and 0.4 mm pitch.

The Bluetooth part is ROM-based, for applications requiring integration up to HCI level. Patch RAM is available, enabling multiple patches/upgrades and fast time to volume. The main interfaces are UART, SPI or SDIO for HCI transport, PCM or I2S for voice and a WLAN coexistence interface. The radio has been designed specifically for single chip requirements, for low power and minimum BOM count.

The FM radio transceiver contains both a broadcast FM radio tuner and a FM transmitter for portable applications with worldwide FM band support. (De)multiplexing and (de)modulation are performed in a digital data path. A small embedded microcontroller manages the flexibility of the data path and takes care of the overall control of the transceiver. This microcontroller is also used for transmission and reception of the European Radio Data System (RDS) and the North American Radio Broadcast Data System (RBDS), including all required symbol decoding, block synchronization, error detection, and error correction functions. The FM can be controlled by the Host via a dedicated I2C interface or via the Bluetooth HCI interface. A Host-level API is offered in order to facilitate integration of the FM driver on the Host. Also a low-level API is supported.

The Bluetooth transceiver and FM transceiver are integrated on the same silicon, and share at top-level power supplies, clocks and reset control. The chip integrates several regulators to generate the internally needed voltages from the Host platform supply input.

The low external BOM count results in an overall PCB footprint of less than 36 mm^2 (using 0201 components where possible, with a 0.3 mm spacing rule). The FM antenna matching network, which depends on the specific antenna implementation, is included in this footprint.

2 Ordering information

Table 1. Ordering information

Order code	Package	Packing
STLC2690WTR	WLCSP	Tape on reel

3 Revision history

Table 2. Document revision history

Date	Revision	Changes
17-Jan-2008	1	Initial release.