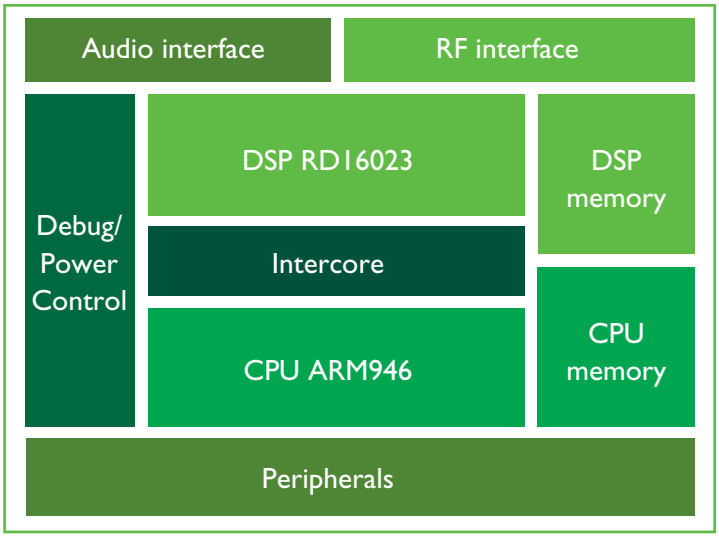
PCF5213 Nexperia™ multimedia baseband

First of a new family for advanced 2.5G/3G mobile multimedia phone applications

The PCF5213 begins a new generation of baseband controller ICs for GSM, GPRS, EDGE and 3G (UMTS) handsets. It forms the basis of Philips' forthcoming multimedia and system solution platforms, and enables manufacturers to develop mobile terminals with fast data-rates, advanced multimedia features and Java applications.

Semiconductors



Key features

- Supports quad-band (850, 900, 1800, 1900 MHz) operation for GSM/GPRS/EDGE and acts as dual-mode UMTS controller
- Fast data transfer: EGPRS Class 12, HSCSD Class 12 and CSD
- Full speech coding: AMR, EFR, FR, HR codecs with WAMR upgrade option
- Powerful ARM946E-S® 104 MHz RISC processor with on-chip caches
- Powerful Adelante RD16023 104 MHz REAL DSP sub-system with extended address range through paging mechanism
- Advanced multimedia features:
  - stereo audio DAC/ADC
  - microphone bias output and analog FM input
  - FM radio input
  - MP3 Player
  - polyphonic melody generation (FM synthesizer) and integrated hands-free buffer
- Peripheral connectivity: 920 kbit/s UART, Flash Card Interface, UMTS SIM (T = 1 protocol) and 1.8/3 V SIM interfaces, USB, I^2S, SPI, I^2C-bus, etc.
- Enhanced External Bus Interface: page/burst mode support and extended address range
- 3 JTAG ports — DSP, SC, and Analog —for simultaneous, real-time debug
- Increased security: version register accessible by SC software and serial number register for security applications
- Advanced process technology: 0.18 or 0.12 (digital part) and 0.25 µm (analog part) CMOS.

General information

To match the growing importance of mobile multimedia, our new family of highly-integrated Nexperia baseband ICs combines Philips' expertise in baseband processing and multimedia. By supporting advanced applications for 2.5G & 3G terminals, the family can enrich the experience of end users to assure the commercial success of new cellular products and services.

With 'convergence', connectivity becomes increasingly important. The PCF5213 leads the way with peripheral support including USB, MMC, FCI, high-speed UART, etc. And to reduce time-to-market, fully validated software (e.g. protocol stack, multimedia applications) can be provided.

Key blocks

ARM subsystem

The ARM946E-S 32-bit RISC processor can run at several speeds up to 104 MHz. It drives the peripheral interfaces, power management, all three layers of the GSM protocol stack, the MMI software and some data applications. It consists of an ARM9E-S core, instruction and data caches, tightly-coupled instruction and data memories, a memory protection unit, and an AMBA AHB bus interface with write buffer. The core's two internal co-processors allow software access to the debug communications channel and caches configuration, SRAM, protection unit, write buffer, and other system options e.g. big or little-endian operation.

DSP subsystem

Based on Adelante's RD16023 DSP core, the advanced DSP sub-system provides all GSM-specific signal processing, (voice & channel coding, equalization) and features like echo/noise suppression, voice recognition, and data compression.

Peripheral blocks

The PCF5213 has an extensive on-chip peripheral set designed to support communication as well as end-user applications. Included peripheral blocks are:

- DMA unit for fast peripheral input and output
- GPRS encryption algorithm coprocessor
- System and watchdog control timers

PHILIPS

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- 16 external interrupts with de-bouncing capability
- 16-bit external bus interface with page and burst mode support
- Control serial link for analog functions
- 44 general purpose I/O pins multiplexed with functional pins
- GSM/UMTS SIM units
- Keyboard scanner
- Flash Card Interface
- USB device (version 1.1)
- Real-Time Clock
- PWM with three output channels.
- 2 UARTs (920 kbit/s)
- low-speed IrDA
- 3 SPIs (master/slave) up to 13 Mbit/s
- 16-bit I^2S interface
- 400 kbit/s I^2C bus.

ARM software and DSP firmware library

Philips' ARM software and DSP firmware library includes all GSM Phase 2 algorithms as well as a wide set of complementary DSP features/ algorithms. It consists of:

- voice-coding (FR, EFR, HR, AMR, WBAMR), equalizer, channel coder algorithms and voice recognition
- data compression/coding for T/NT data, GPRS, HSCSD, EDGE
- echo cancellation, noise suppression
- hardware abstraction layer modules to accelerate software integration
- kernel-independent drivers for USB, MP3 player, melody generation.

Debug/security capability

The Smart Debug Interface (SDI) provides full-context access to the multi-processor core and the complete address space. A unique 128 serial number register and always booting from internal ROM provides a secure and robust environment for SIMLOCK applications.

Radio interface

A flexible RF control unit supports existing and future BB/RF interfacing requirements. Its parallel and serial programmable interfaces can be configured to run in un-timed or timed mode.

Audio interface

A combination of advanced hardware and firmware provides the high-performance audio interface with many features:

- HiFi stereo DAC with 8 kHz to 48 kHz sampling rate
- Stereo ADC with 8 kHz to 32 kHz sampling rate
- Bluetooth, external stereo DACs and application co-processor are supported via the IIS or IOM-2™ interfaces
- Fully integrated handsfree power amplifier
- 8 kHz & 16 kHz support in all audio features
- Improved audio post processing with
  - dynamic compression in downlink direction
  - 2 audio equalizers for MMI correction and loudspeaker correction
  - adaptive volume control
  - bad frame cancellation for all speech codecs
  - burst reduction to reduce 217 Hz and harmonic noise
- Wideband synthesis
- Artificial extension of narrow-band speech (4 kHz) to wideband speech (8 kHz).

Tools

Several development tools are available to support customers including development boards for software and RF integration, real-time trace support (for HP165xx series and Lauterbach Trace 32) and multicore development tools (including compilers, simulator, debugger and emulator).

Packaging and availability

The PCF5213 is available in a 228LFBGA package with a 12 x 12 mm footprint. Samples are available and mass production will start in mid 2003.

Philips Semiconductors

Philips Semiconductors is a worldwide company with over 100 sales offices in more than 50 countries. For a complete up-to-date list of our sales offices please e-mail sales.addresses@www.semiconductors.philips.com.
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Date of release: January 2003
Document order number: 9397 750 10442

Published in The Netherlands