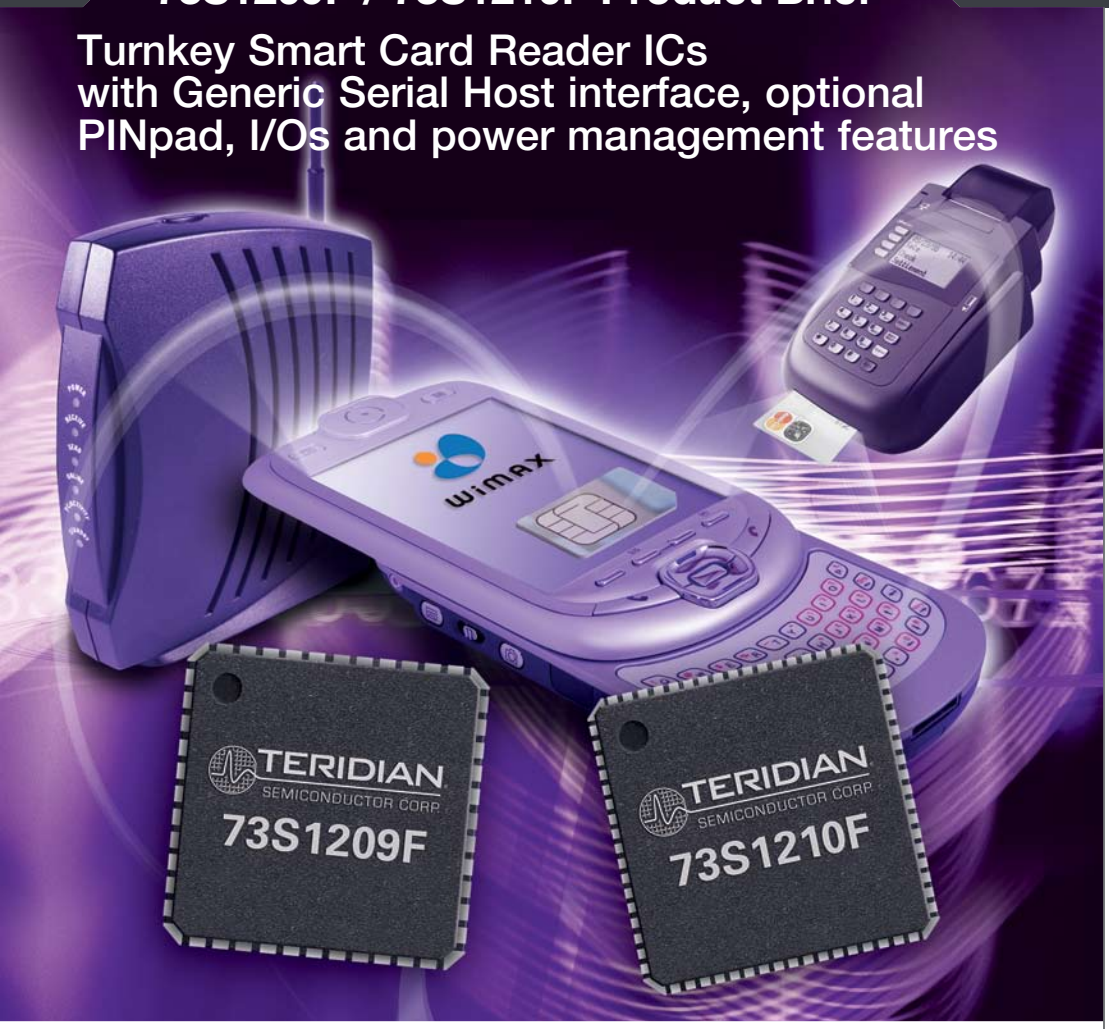
73S1209F / 73S1210F Product Brief

Turnkey Smart Card Reader ICs with Generic Serial Host interface, optional PINpad, I/Os and power management features



The Teridian 73S1209F and 73S1210F ICs are state-of-the-art, self-contained smart card reader Integrated Circuits that will find their places everywhere a smart card reader function – single or multi-slots – needs to be implemented, particularly when development time and investment must be minimized. These ICs take care of both electrical and protocol layers to communicate with smart cards or SIMs. They are built around the Teridian 80515 CPU core, and can run either Teridian turnkey embedded firmware, or alternatively customer's code, that can be developed and loaded directly into the on-chip 32KB Flash, or delivered by Teridian as a dedicated masked-ROM version.

Implementation of a smart card reader can be a time-consuming task, requiring in-depth smart card experience, especially when it comes to implementing the software protocol layer in compliance with applicable standards like EMV or NDS. The Teridian 73S1209F and 73S1210F ICs, used in conjunction with Teridian ready-to-use PC/SC firmware and optional host drivers will help dramatically simplify the design and shorten development and certification timescales.

Whenever compliance with ISO-7816, EMV 4.1, Windows WHQL, NDS(*) or with GSM11-11 standards is required, the Teridian 73S1209F and 73S1210F ICs are the right solutions. The chips can immediately connect to any host controller through a serial link. While the Teridian IC takes care of the smart card protocol layer, the host controller is freed up from the smart card timing constraints, and it only has to exchange simple PC/SC commands through the serial link to control the smart card reader function. Teridian ICs can be connected with external 73S8010x ICs to extend the number of smart card slots (for instance in the case additional SAM cards must be supported like in Point-of-Sales terminals).

Teridian 73S1209F and 73S1210F ICs differ from their power supply voltage ranges and power management options.

(*) 73S1209F only – Formal approval pending.

Key Applications

- *SIM Readers in wireless devices (WiMAX, GPRS, GSM etc)*
- *Point-of-Sales terminals*
  - *Immediate compliance with EMV4.1 Level 1*
- *Payphones*
- *Vending and ticketing machines*
- *Audio/Video:*
  - *Conditional Access and payment slots in digital STB, PVR and Integrated DTVs*
- *General purpose smart card and SIM readers*

Key Advantages

- *Self-contained smart card reader IC*
- *Market's lowest cost*
- *Tiny QFN 7x7 or 8x8mm package with very few external passive components*
- *Low power*
- *Wide choice of power supply options*
- *Turnkey firmware available from Teridian (no 3rd party involved…):*
  - *Compliant with PC/SC, ISO7816 and EMV4.1 specifications*
  - *Features a Power Down mode accessible form the host*
  - *Supports Plug & Play over serial interface*
  - *Windows™ XP driver available (*)*
  - *Windows™ CE / Mobile driver available (*)*
  - *Drivers for Linux and other OS: Upon request*
- *Or for custom developments:*
  - *A complete set of ISO-7816, EMV4.1 & PC/SC libraries are available*

(*) Contact Teridian for availability and conditions

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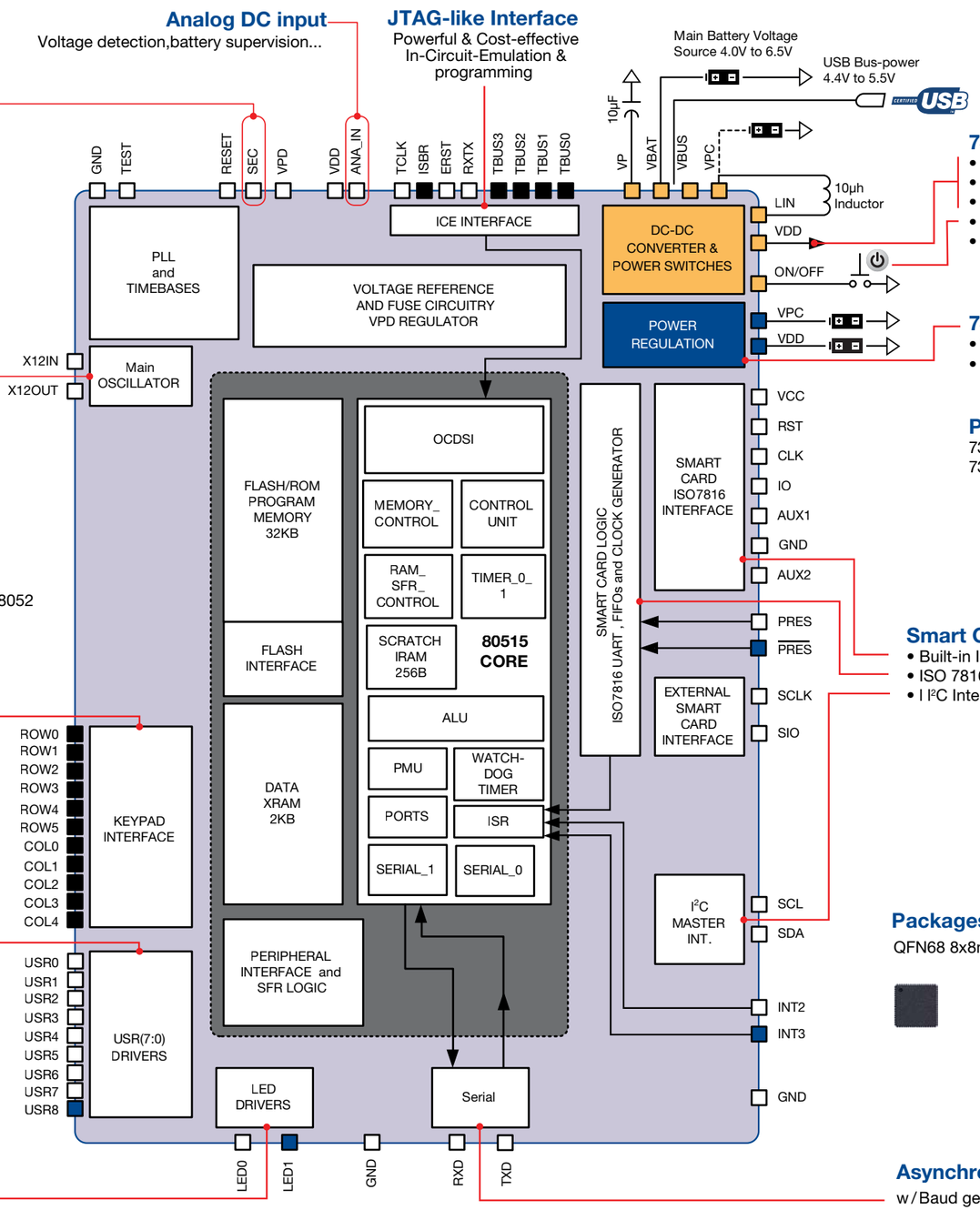
73S1209F-73S1210F Block Diagram



Analog DC input
Voltage detection,battery supervision...

JTAG-like Interface
Powerful & Cost-effective In-Circuit-Emulation & programming

Security fuses
Prevent from unauthorized intrusion

Main oscillator: 4MHZ to 12MHz
Requires an external crystal

Memories:
- 32 32KB Flash KB / ROM
- 256 B Scratchpad IRAM
- 2 KB RAM (user XRAM)

High performance 80515 core:
- 1 clock cycle / instruction
- Up to 24MIPS available: As powerful as an ARM7
- Instruction set compatible with industry-standard 8051/8052

Allows encryption of PIN, encryption of data-exchange over the USB, etc.

5x6 PINpad interface
Hardware scan & Debounce
Keypress interrupt

8 (9 in 73S1209F QFN68) General purpose I/Os
Can be set independently as inputs, outputs, edge or level sensitive, interrupt

LED outputs
Current programmable

73S1210F Only
73S1209F Only
Available in QFN68 Flavors only

73S1210F Power management Circuitry:
- DC-DC Converter
- Multiple power supply inputs with internal switches
- Supports USB Bus-Power
- Input for an ON/OFF main system switch to ground
- Overall power consumption <1µA in OFF mode

73S1209F Power Regulation:
- VCC card generation from LDO
- Digital core requires its own VDD supply

Power Supply:
73S1209F: dual voltage needed: 2.7V to 3.6V and 4.75V to 6.5V
73S1210F: Single voltage needed: As wide as 2.7V 6.5V

Smart Cards:
- Built-in ISO 7816-3 / EMV 4.1 electrical interface
- ISO 7816 UART (supports up to 115kbps speed) with 2 dedicated FIFOs
- I ²C Interface to drive external 73S8010X interfaces

Packages
QFN68 8x8mm

QFN44 7x7mm (72S1209F only)

Asynchronous serial interface
w / Baud generator, up to 115 kbps

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73S1209F / 1210F Boards & Kits

The Teridian **73S1209F and 73S1210F evaluation-boards** are pre-loaded with Teridian ready-to-use "CCID-RS232" firmware. Each board consists in a turnkey smart card reader controllable by means of a serial / RS232 interface. The firmware implements a Teridian "SLIP" protocol that follows the PC/SC specifications.

For immediate evaluation, the board can be connected to a Windows™ XP based computer through RS232. It only requires Teridian Windows™ XP / PC/SC driver to be loaded in the computer. Any smart-card-aware application running on the PC will then be able to access Teridian smart card reader functions. The board can also be connected to any processor platform through its generic asynchronous serial line. Teridian provides a detailed user's guide that will allow the developer to implement its own host driver to communicate with the Teridian IC.

The choice between the 2 boards will depend on the power supply(ies) available on the customer's application, and therefore which of the ICs (73S1209F or 73S1210F IC) will be better suited. The power-management added-features of the 73S1210F are available on the board and should be considered when making the selection between the 2 ICs / boards. The evaluation board features 2 smart card slots (the 2nd being driven by an on-board 73S8010R electrical interface), a PINpad, an LCD screen (2 lines of 16 characters, 5x7 dot matrix using an integrated driver SAMSUNG type KS0066) and RS232 connectivity, as well as a breadboard area (with access to user I/Os and to the analog input) for prototyping. The board has a connector for the JTAG-like ICE that allows real-time debugging of custom applications (firmware).

Customers can also develop their own embedded firmware using Teridian **73S1209F** or **73S1210F Development Kits**: Those include one 73S1209F or 73S1210F evaluation board, a JTAG-like In-Circuit-Emulator (ICE), and a CDROM.

The JTAG-like **In-Circuit-Emulator** (ICE) is a Signum™ ADM51, and is specifically designed to operate with Teridian 80515 based System-on-Chips.

The **CDROM** contains the 73S12xxF API libraries written in C language that bring immediate access and control to the 73S1209/1210F blocks and features. These libraries include T=0 and T=1 protocol layers (i.e. smart cards libraries, compliant with ISO7816 and EMV 4.1 level 1), that can be used with the built-in ISO7816 interface or with some external 73S8010 ICs (support of multiple smart / SIM card slots). Are also included: Management functions for the controller (clocks, timers, power management, interrupts), for the LCD & PINpad, and for the various I/Os (user I/Os, PINpad, LEDs, analog input).

The Teridian libraries and reference designs have been developed using the 8051 development environment from Keil®, including C-compiler. Similar environment, version C51V6.21 or higher, is needed to develop 73S1209F or 73S1210F -embedded applications either in C or assembly code (the Keil®, environment is not included in the kit).

Teridian Flash Programmer:

Teridian 73S1209F and 73S1210F (Flash) integrated circuits can be programmed using the JTAG-like In-Circuit-Emulator (ICE) included in the kit. Alternatively, Teridian offers a cost-effective programming tool, more suitable to production line requirements: The **Teridian Flash programmer model TFP1** can be used in the production line or in the field to program 73S1209F and 73S1210F devices through the JTAG-like interface directly on the PCB of the 73S1209F / 73S1210F -based product. The Teridian programmer can be used as a standalone tool, or controlled from a PC, or even from an Automated Test Equipment (ATE).

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