

16-pin smartcard interface ST8034P demonstration board

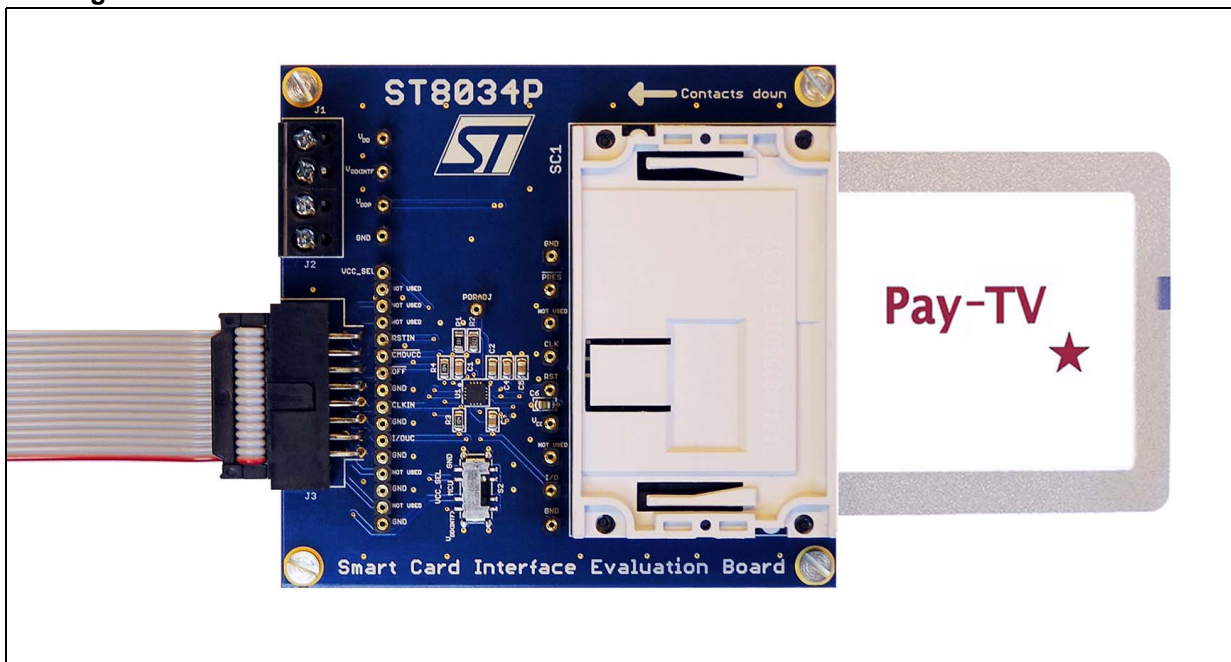
Introduction

The purpose of this document is to describe, and provide information on, how to efficiently use the ST8034P smartcard interface device demonstration board.

The ST8034xx is a family of complete smartcard interface devices, compatible with ISO 7816, NDS and EMV™ 4.3 payment systems that provide selectable supply voltage for the smartcard with automatic deactivation sequence in case of overload, short-circuit or undervoltage, with programmable internal or external clock signal, reset signal and protected I/O data lines. The ST8034HC and ST8034C product variants also provide a chip select function that allows the device interface to be isolated from the microcontroller bus signals and to share the bus among multiple card interface devices in a parallel combination.

In summary, ST8034xx interface devices are placed between the smartcard and the microcontroller to provide all supply, protection, detection and control functions, with just minimum external components.

Figure 1. Demonstration board with card connector and microcontroller board interface



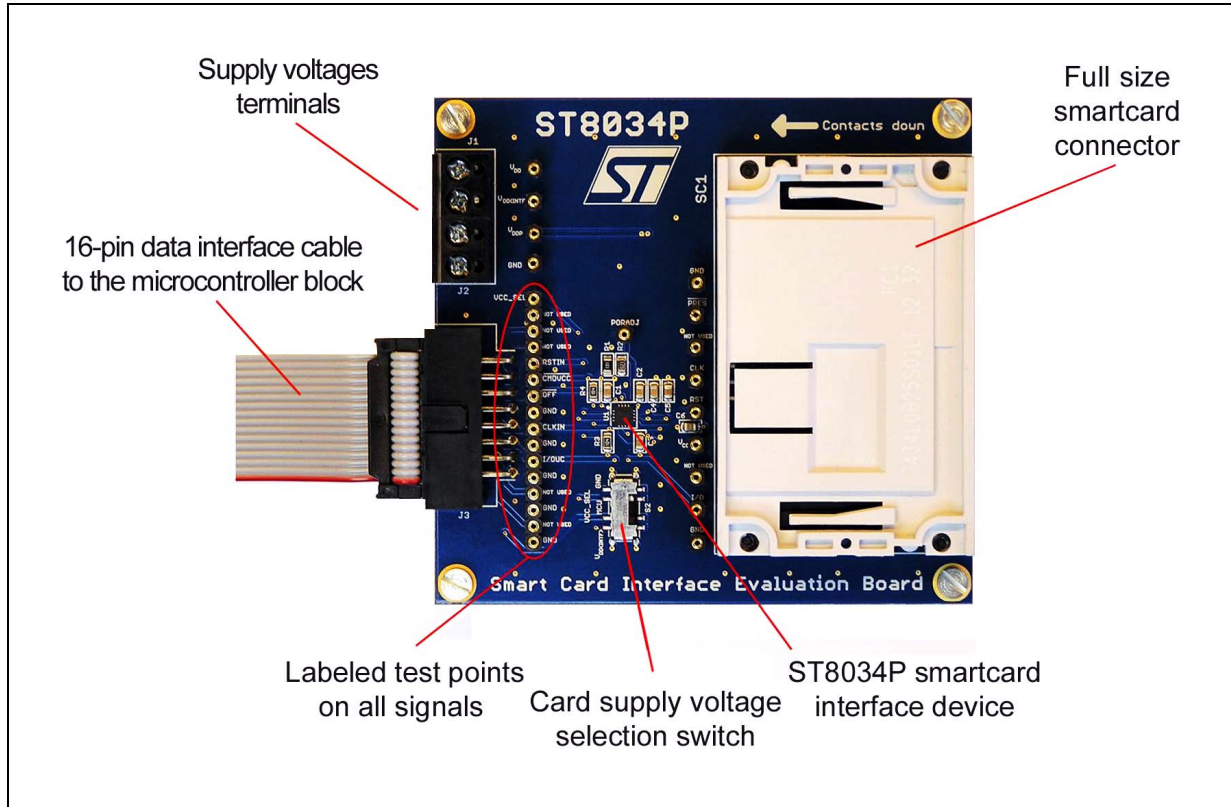
1 Applications

Smartcard readers for

- Set-top boxes
- Pay-TV
- Identification
- Tachographs
- Banking

2 Description

Figure 2. Demonstration board description



2.1 Use of the demonstration board

The ST8034P demonstration board is designed both for standalone operation or to be fully controlled by the microcontroller; it is fully configurable and provides access to all the signals including supply voltages through labeled test points and uses a standard connector for a simple communication interface with the microcontroller block. The labeled test points on the board are in the same order as the signals in the flat interface cable.

For an easy connection of oscilloscope probes to the test points, remove the plastic tip with the hook from the probes and insert the center pin into the test point terminal. Ground test points are available in a sufficient amount throughout the board.

Card supply (V_{CC}) selection switch: the demonstration board provides easy but flexible card supply voltage selection either by the onboard configuration switch driving the tristate V_{CC} selection input pin V_{CC_SEL} or by the microcontroller. Put the V_{CC_SEL} switch to the position " $V_{DD(INTF)}$ " (logic high level) to select $V_{CC} = 5\text{ V}$ or " GND " (logic low level) to select $V_{CC} = 3.0\text{ V}$, see [Table 1](#), or to the center position (" MCU "/floating) which leaves this pin floating (i.e. selects $V_{CC} = 1.8\text{ V}$) and connects this signal to the microcontroller interface to allow its control of this input signal if the MCU is connected.

Table 1. V_{CC} selection by tristate VCC_SEL switch

VCC_SEL position	V _{CC}
V _{DD(INTF)}	5 V
MCU/floating	1.8 V or controlled by the microcontroller, if connected.
GND	3.0 V

2.2 Smartcard interface

The demonstration board contains a full size smartcard connector. Insert the smartcard from the right-hand side, card contacts facing down. Card presence detection is implemented (a presence switch inside the card connector, normally open).

2.3 Interface to a microcontroller block

A standard 16-pin header connector with a standard cable is used to interconnect the ST8034P demonstration board module with a microcontroller block. The voltage level for communication on this interface is V_{DD(INTF)}.

2.4 Default functionality notes

- No floating pins: for simple standalone testing, all the input signal levels are softly defined by pull-up or pull-down resistors on the board, refer to [Figure 4: Schematic diagram](#).
- The PORADJ undervoltage threshold on the V_{DD(INTF)} supply voltage (UVLO) is set by R1 and R2 to 1.5 V typ. The resistors can be replaced with different values to set different undervoltage thresholds on V_{DD(INTF)}:

$$V_{DD(INTF)} \text{ UVLO threshold (falling)} = (R1 + R2) / R2 \times V_{TH(PORADJ)}$$

$$V_{DD(INTF)} \text{ UVLO threshold (rising)} = (R1 + R2) / R2 \times (V_{TH(PORADJ)} + V_{HYST(PORADJ)})$$

For detailed specifications of the voltage threshold values, refer to Table 14 of the ST8034P datasheet.

The sum of R1 + R2 should be about 100 kΩ, which is a good compromise between a sufficient robustness and a minimum current consumption.

Please consider tolerance ranges of the resistors used in the resistor divider and specifications range of the V_{TH(PORADJ)} to make sure that even in the worst case the real V_{DD(INTF)} undervoltage deactivation threshold does not fall in the desired operating voltage range (i.e. consider also voltage supply tolerance range).

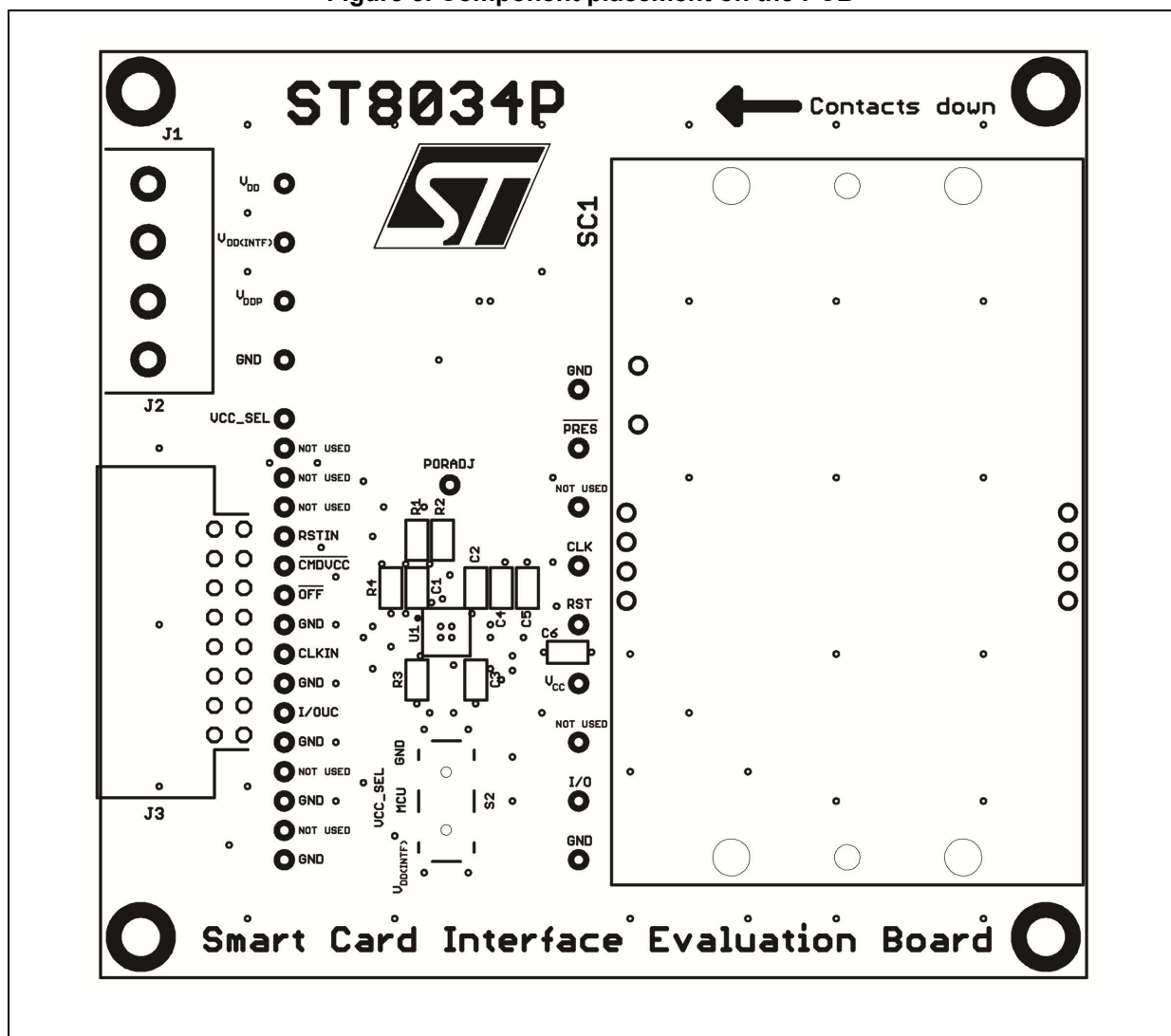
3 Board layout

3.1 Layout recommendations

The ST8034xx family of devices includes an LDO block to generate V_{CC} supply voltage for the smartcard, which (in contrast to previous ST8024/8024L devices with a charge pump) does not generate any noise and therefore even the requirements for a printed circuit board layout and external component selection are not so strict (general PCB layout rules apply). On the other hand, the LDO requires the input voltage (V_{DDP}) to be at least about 100 mV greater than the desired output voltage (V_{CC}). Place the decoupling capacitors as close as possible to the appropriate pin of the ST8034 device and use sufficiently wide PCB tracks. Make the data and clock lines as short as possible and use a ground plane.

3.2 Component placement

Figure 3. Component placement on the PCB



5 Bill of material

Table 2. Bill of material

Component	Value	Type	Manufacturer	Note
U1	Smartcard interface device	ST8034PQR	STMicroelectronics®	QFN16 3 x 3 x 0.8 mm package
SC1	Smartcard connector	7434L0825S01LF	FCI	
J1	Power supply terminal	ARK210/2EX	Xinya	
J2	Power supply terminal	ARK210/2EX	Xinya	
J3	Header connector	T821116A1R100CEU	Amphenol	
S2	V _{CC} selection switch	S555820501	ALPS	
R1	18 kΩ	0805		
R2	82 kΩ	0805		
R3	100 kΩ	0805		
R4	100 kΩ	0805		
C1	100 nF	0805		
C2	100 nF	0805		
C3	100 nF	0805		
C4	100 nF	0805		
C5	10 μF	0805		
C6	220 nF	0805		
Cable connectors	2 x 8 pin / 16-lead	T812116A101CEU	Amphenol	
Cable	16-lead	1-57040-6	TE Connectivity	

6 Revision history

Table 3. Document revision history

Date	Revision	Changes
27-Aug-2013	1	Initial release.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

ST PRODUCTS ARE NOT AUTHORIZED FOR USE IN WEAPONS. NOR ARE ST PRODUCTS DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2013 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

