OM5597/RD2612

POS Reference Design

Rev. 1.0 — 26 May 2011
208510

Objective short data sheet
COMPANY PUBLIC

1. General description

OM5597/RD2612 is a reference design of a cost effective EMV compliant Point of Sales Terminal based on NXP components. It provides an EMV Level 1 compliant software stack for contactless as well as contact payment based on PN512/C2 and TDA8026. The user interface composed out of an LCD screen and a keyboard demonstrates the following showcases:

- First steps of contact and contactless EMV payment with JCOP Dual Interface card
- First steps of payment with a mobile phone including P2P data exchange
- Closed loop payment based on MIFARE DESFire EV1 together with MIFARE SAM AV2

The OM5597/RD2612 board comes together with all design files including the hardware Gerber Files and the software source files.

2. Features and benefits

2.1 Features

- EMVCo compliant contactless smart card reader based on PN512/C2 with RF amplifier
- EMVCo compliant contact smart card reader based on TDA8026
- EMV Level 1 compliant contact and contactless software stack
- First step of contact and contactless EMV payment application selection with card/phoneshowcase
- Closed loop payment showcase
- NFC Peer to Peer communication showcase

2.2 Benefits

- Easy integration of NXP components into a cost efficient POS reader
- Fast development of a certifiable software stack, due to reuse of already EMV L1 certified source files
- Reusable showcase of closed loop payment, contact and contactless payment card selection as well as NFC functionality

3. Applications

- Payment

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	supply voltage	-	-	5.0	-	V
T_{amb}	ambient temperature	-	-	+25	-	°C

5. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
OM5597/RD2612	-	Package containing: POS Reference Design Board USB cable MIFARE DESFire EV1 card Pre Personalized JCOP Payment card CD with documentation and software	-

6. Block diagram

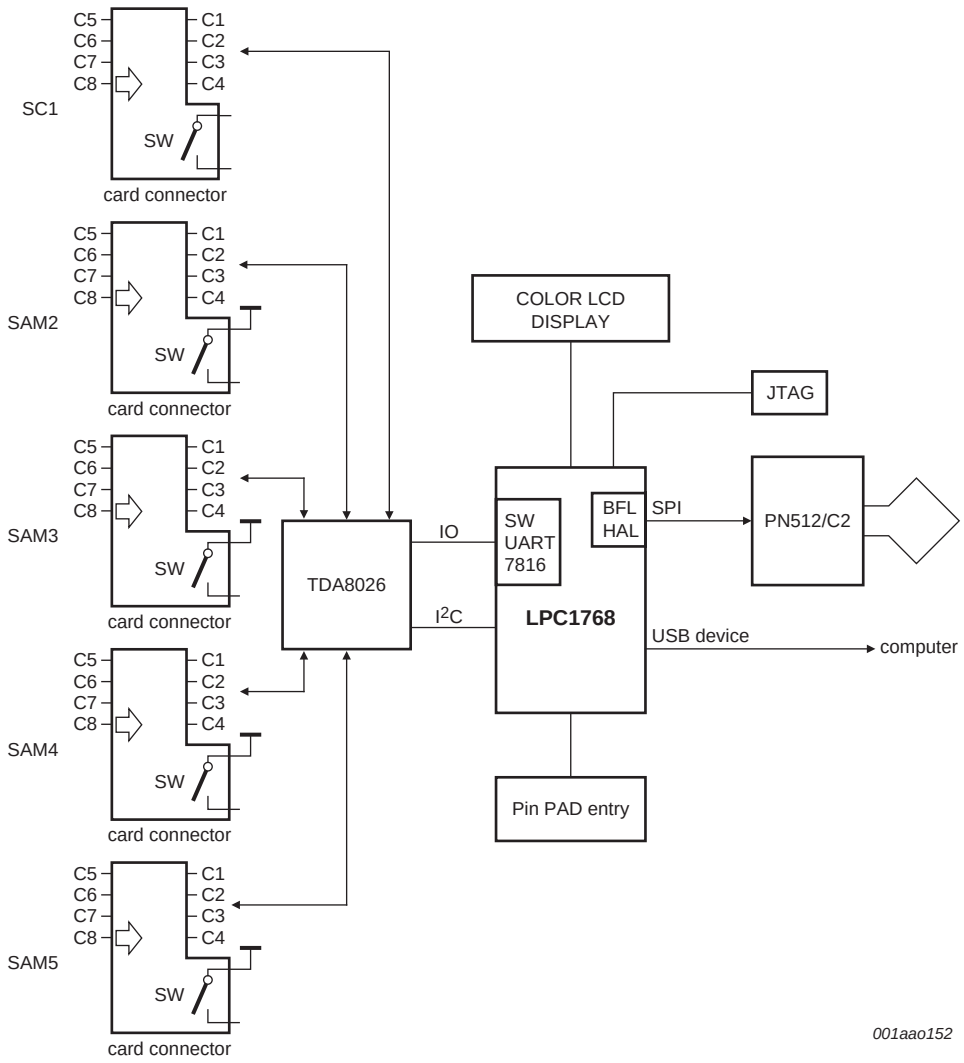

Fig 1. Block diagram of OM5597/RD2612

7. Functional description

7.1 Content

The kit includes the following items:

- OM5597/RD2612, Point of Sales board
- 1 USB cable
- 1 MIFARE DESFire EV1 card
- 1 pre personalized JCOP Dual Interface card
- CD with documentation and software.

The MIFARE SAM AV2 needs to be organized separately.

7.2 Hardware architecture

The POS reference board, see Figure 1, is composed out of the following NXP components:

- PN512/C2 contactless NFC reader IC supporting ISO/IEC 14443 type A and B, as described in Ref. 1
- RF Amplifier for the PN512, as described in Ref. 8
- TDA8026 5-slot contact smart card IC, as described in Ref. 2
- Cortex M3 LPC1768, as described in Ref. 3
- a display for the user interface
- a key pad for PIN entry within the closed loop payment showcase

The quick startup guide, see Ref. 6, gives directions how to start working with the POS reference design. The board is structured of two main parts.

The main board provides the connections on the user interface (display and key pad), the daughter board implements the main electronics such as the PN512, TDA8026 and LPC1768. The antenna is part of the main board but is directly connected to the daughter board. If one wants to remove the daughter board, the antenna needs to be unsoldered in advance.

A serial interface (RS232) can be used to adapt or reprogram the software of the board using FlashMagic.

7.2.1 Power supply

The board can be supplied using USB or over an external power supply connected to the powerplug. To power the board with USB, the type-B USB connector must be connected to a host computer through a USB cable. The jumper close to the USB type-B connector must be set in order to connect VBUS to the 5 V input.

7.3 Software architecture

The software stack coming together with the POS reference design is embedded into the FreeRTOS environment of the LPC1768. It can be compiled and adapted using the LPCXpresso environment. For more details, please refer to Ref. 7.

The software stack is composed of the following items:

- A contactless EMV library based on a PN512 HAL
- A contact EMV library based on a TDA8026 HAL
- Drivers for the interaction with the user interface such as the display and key pad.
- A showcase using the LLCP protocol based on the contactless EMV library, showing the possible Peer to Peer communication of a POS terminal with a NFC phone
- A showcase using the contactless EMV library, performing a Paypass Payment Selection of a contactless payment media
- A showcase of a closed loop payment based on MIFARE DESFire EV1 and MIFARE SAM AV2
- A showcase using the contact EMV library, performing a Payment Selection of a contact payment card

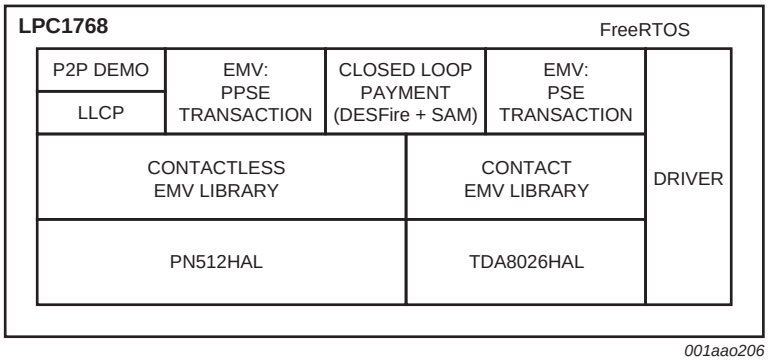

Fig 2. Software overview

7.4 Certification

The OM5597/RD2612 went successfully through the EMV L1 certification both for contact and contactless terminal certification.

8. Limiting values

Table 3. Limiting values[1]

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to VSS (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	supply voltage	active reader	-	5.00	-	V
T_{amb}	ambient temperature	-	-	+25	-	°C
d_{cpl}	coupling distance	measured from the center of the antenna	-	50	-	mm

[1] Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

9. Abbreviations

Table 4. Abbreviations

Acronym	Description
EMV	Europay Mastercard VISA (a Payment Industry organization publishing the EMV standard)
EMVCo	Compliant to the Europay Mastercard VISA standard
JCOP	Java Card Operating System
NFC	Near Field Communication
PIN	Personal Identification Number
POS	Point Of Sales
RF	Radio Frequency
RTOS	Real Time Operating System
USB	Universal Serial Bus

10. References

[1] **Data sheet PN512/C2 Contactless reader IC —** available on NXP web

[2] **Data sheet TDA8026 Contact reader IC —** available on NXP web

[3] **Data sheet Cortex M3 LPC1768 —** available on NXP web

[4] **Short data sheet MF3ICD81 MIFARE DESFire EV1 —** available on NXP web

[5] **Short data sheet P5DF081 MIFARE SAM AV2 —** available on NXP web

[6] **User Manual POS Reference Design Quick Startup Guide —** available on NXP web

[7] **User Manual POS Reference Design Firmware description —** available on NXP web

[8] **Application Note AN10893 RF Amplifier for NXP contactless MFRC52x —** available on NXP web

11. Revision history

Table 5. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
OM5597_RD2612_SDS v 1.0	20110526	Objective short data sheet	-	-

12. Legal information

12.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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This NXP Semiconductors IC is ISO/IEC 14443 Type B software enabled and is licensed under Innovatron's Contactless Card patents license for ISO/IEC 14443 B.

The license includes the right to use the IC in systems and/or end-user equipment.

RATP/Innovatron Technology

Purchase of NXP ICs with NFC technology

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For sales office addresses, please send an email to: **salesaddresses@nxp.com**

14. Contents

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