



# SIMCOM WCDMA Wireless Module Camera Interface Application Note\_V1.01



**Camera Interface Application**

<b>Document Title:</b>	Camera Interface Application Note
<b>Version:</b>	1.01
<b>Date:</b>	2010-03-23
<b>Status:</b>	Release
<b>Document Control ID:</b>	Camera Interface Application Note_V1.01

**General Notes**

SIMCom offers this information as a service to its customers, to support application and engineering efforts that use the products designed by SIMCom. The information provided is based upon requirements specifically provided to SIMCom by the customers. SIMCom has not undertaken any independent search for additional relevant information, including any information that may be in the customer's possession. Furthermore, system validation of this product designed by SIMCom within a larger electronic system remains the responsibility of the customer or the customer's system integrator. All specifications supplied herein are subject to change.

**Copyright**

This document contains proprietary technical information which is the property of SIMCom Limited., copying of this document and giving it to others and the using or communication of the contents thereof, are forbidden without express authority. Offenders are liable to the payment of damages. All rights reserved in the event of grant of a patent or the registration of a utility model or design. All specification supplied herein are subject to change without notice at any time.

*Copyright © Shanghai SIMCom Wireless Solutions Ltd. 2010*

## Contents

Contents .....	3
Version history .....	5
1 Introduction .....	6
2 Scope of the document .....	6
3 PIN define of camera interface .....	7
4 Digital Sensor .....	7
5 Analog Sensor .....	8
6 Layout guide .....	9
7 Camera Interface Related Commands .....	10
8 Switch between camera interface and GPIO .....	10

SIMCOM CONFIDENTIAL FILE

## Figure Index

FIGURE 1: DIGITAL CAMERA MODULE INTERFACE.....	8
FIGURE 2: CAMERA MODULE INTERFACE WITH ANALOG SENSOR .....	9

SIMCOM CONFIDENTIAL FILE

## Version history

Date	Version	Description of change	Author
2010-03-23	01.00	Origin	

SIMCOM CONFIDENTIAL FILE

## 1 Introduction

SIM52XX provides a camera module interface for supporting camera and video phone functions. This document describes how to use the camera interface of WCDMA wireless module of SIMCom. (SIM52XX represents the series which is stated below.)

## 2 Scope of the document

This document is intended for the following versions of the SIMCom modules

- SIM5210
- SIM5211
- SIM5215/SIM5216
- SIM5218

CAM\_D0 and CAM\_D1 are only defined in SIM5210/SIM5218. In other WCDMA modules of SIMcom, these 2 pins are reserved.

### 3 PIN define of camera interface

The camera module interface consists of the following:

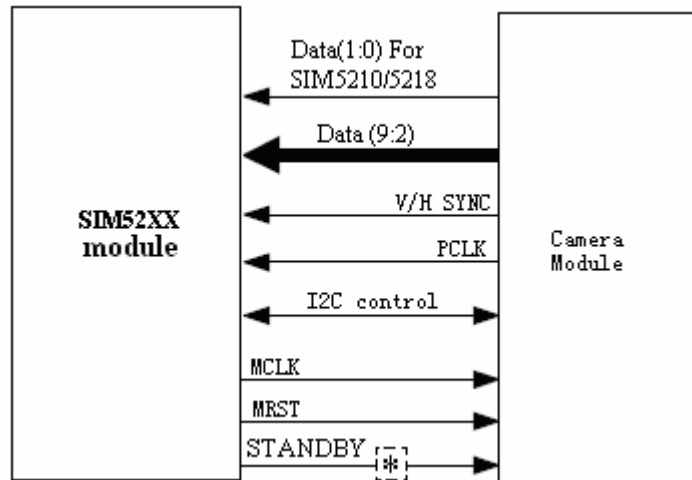
- 10 bit data bus for the pixel data information
- Horizontal and vertical synchronization signals
- 2 wire I2C bus as a control path between the SIM52XX module device and the camera module

This table show the pins define of camera interface, CAM\_D0 and CAM\_D1 are only defined in SIM5210/SIM5218. In other WCDMA modules of SIMCOM, these 2 pins are reserved.

Pin	Name	Function
14	CAM_D0	Bit 0 of RGB video component output (Only for SIM5210/5218)
55	CAM_D1	Bit 1 of RGB video component output (Only for SIM5210/5218)
15	CAM_D2	Bit 2 of RGB or YUV D0 video component output
54	CAM_D3	Bit 3 of RGB or YUV D1 video component output
16	CAM_D4	Bit 4 of RGB or YUV D2 video component output
53	CAM_D5	Bit 5 of RGB or YUV D3 video component output
17	CAM_D6	Bit 6 of RGB or YUV D4 video component output
52	CAM_D7	Bit 7 of RGB or YUV D5 video component output
18	CAM_D8	Bit 8 of RGB or YUV D6 video component output
51	CAM_D9	Bit 9 of RGB or YUV D7 video component output
19	CAM_HSYNC	Video horizontal line synchronization signal
50	CAM_VSYNC	Vertical sync output
21	CAM_CLK	master clock input
49	CAM_PCLK	Pixel clock output
48	CAM_RESET	Master reset input, active low
47	IIC_SDA	Serial interface data input and output
46	IIC_SCL	Serial interface clock input
20	GND	Ground
22	CAM_STANDBY	Power-down mode selection “0”=Normal mode, “1”=Power-down mode

### 4 Digital Sensor

We have tested several kinds of digital sensors, such as OV2640, OV7670, OV7725. So when one will select the sensor module, one should contact us for confirming whether SIM52XX can support this sensor.

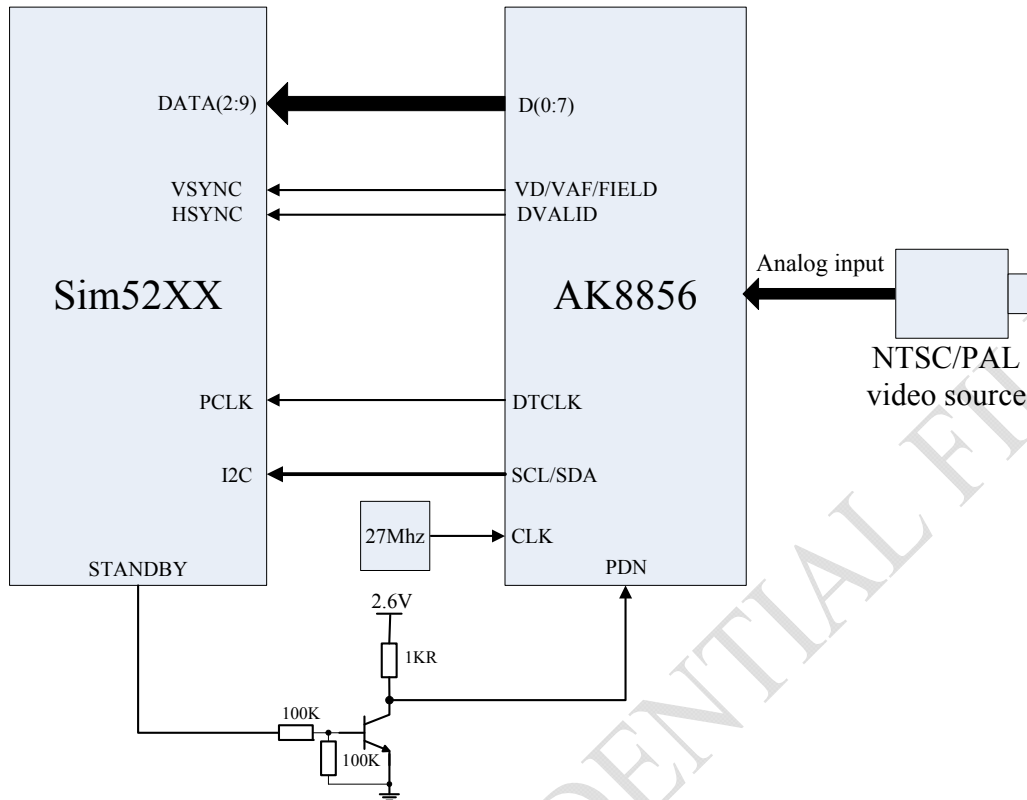


**Figure 1: Digital camera module interface**

\* CAM\_STANDBY: Power-down mode selection “0”=Normal mode, “1”=Power-down mode

## 5 Analog Sensor

SIM52XX can support both digital and analog sensor (NTSC or PAL composite signals output), YUV and RGB data format. When using analog sensor you need to use AK8856 (currently we supported) to decode NTSC or PAL composite signals into digital data first and then transmit the digital data into camera interface. (AK8856 can decode NTSC or PAL composite video signals into digital video data, and with AK8856 you can use analog sensor as video source). Software must be adjusted when use other kinds of sensors. Customer can contact us and give us your request. The power supply of the sensor should be supplied by customer.



**Figure 2: Camera module interface with analog sensor**

**\*NOTE:** *STANDBY* pin of SIM52XX is used to control the powering down or on of camera module. So when one designs application circuit, one should pay attention to the polarity of *STANDBY*. Default polarity of SIM52XX is shown below:

**LOW:** normal operation

**HIGH:** power-down

In Figure 2, the polarity of AK8856 power down is contrary to that of SIM52XX *STANDBY*, so one must use a NPN triode to reverse the polarity of SIM52XX and connect AK8856.

## 6 Layout guide

The data and clock lines of camera are sensitive for the capacitors. Generally the capacitance of the ESD component is too large, if those ESD components are put on to the parallel line then the signal will fade a lot. In order to improve the ESD performance, some 10pF capacitor can be put on data and clock lines for ESD. If one want to choose smaller capacitance ESD component, it should be smaller than 10pF.

It is suggested that data and clock lines of camera try to keep the same length, and they should routine together, and be far away from Vbat and RF signals. Because Vbat and RF signals may disturb the data and clock lines. Also the clock and data lines should be away from other analog

signals for example audio.

## 7 Camera Interface Related Commands

Camera Related Commands please refer to SIM52XX AT Command Set.

## 8 Switch between camera interface and GPIO

### AT+CCGSWT

#### Description

This command is used to switch the function between camera interface and general GPIO, if your project has no camera subsystem existed then you can use this AT command to use camera interface as general GPIO, there are total 14 pins of this type.

SIM PIN	References
NO	Vendor

#### Syntax

Test Command	Responses
AT+CCGSWT=?	+CCGSWT: (list of supported <mode>s) OK
Read Command	Responses
AT+CCGSWT?	+CCGSWT: <mode> OK
Write Command	Responses
AT+CCGSWT=<mode>	OK ERROR

#### Defined values

< mode >
0 – gpio mode
1 – camera mode

**NOTE** if you config such pins to general gpio mode then you can use GPIO AT command to config these GPIOs, like direction, value.

CAMERA INTERFACE	←————→	GENERAL GPIO	NUMBER
HSYNC		GPIO6	

### Camera Interface Application

VSYNC	GPIO7
PCLK	GPIO8
STDBY	GPIO9
DATA0 (only for SIM5210/SIM5218)	GPIO10
DATA1 (only for SIM5210/SIM5218)	GPIO11
DATA2	GPIO12
DATA3	GPIO13
DATA4	GPIO14
DATA5	GPIO15
DATA6	GPIO16
DATA7	GPIO17
DATA8	GPIO18
DATA9	GPIO19

### Examples

```

AT+CCGSWT=?
+CCGSWT: (0-1)
OK
AT+CCGSWT?
+CCGSWT: 1
OK
AT+CCGSWT=1
OK

```

**Contact us:**

**Shanghai SIMCom Wireless Solutions Ltd.**

Add: Building A, SIM Technology Building, No.633, Jinzhong Road, Changning District, Shanghai, P. R. China 200335

Tel: +86 21 3235 3300

Fax: +86 21 3235 3301

URL: [www.sim.com/wm](http://www.sim.com/wm)

SIMCOM CONFIDENTIAL FILE