This is a family of products based on the most advance CMOS mixed signal technology. It integrates image array, signal processing, timing and control circuitry, all on a single chip. It is ideal for applications requiring a small footprint, low power and low cost.

Features:

➢ Small size : 2.65mm diameter
➢ Resolution: 400x400 pixels
➢ Operation voltage 3.3V
➢ Low power consumption (48mW typ.)
➢ Cable size: 1.95mm OD
➢ Cable length: 1M
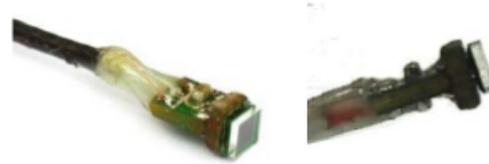
Application Example

● Inspection device
● Endoscope

Pin Description

1. VDD   3VDC
2. GND   Ground
3. CLK   Clock input from backend
4. VTO   Analog video out
5. SDA   I2C data
6. SCL   I2C clock

Application Note

This module needs the backend chip OV420 to work with. For details of backend solution, please refer to the related doc, C3842 (USB application) and C6203, C9203 (handheld application)

Specification

Imager	CMOS imager sensor OV6930
Optical Format	1/10.6"
Clock rate	4MHz
Max exposure	876 x T_{line}
Video Output	Analog
Scan mode	Progressive
Data format	Raw RGB
Picture Element	400x400 pixel
Pixel size	3.0x3.0um
Effective image area	1224x1212um
S/N Ratio	38dB
Dynamic range	68dB
Operation Voltage	3.3VDC
Operation Current	15.4mA max
Connector	6pin cable
Connection	VDD, GND, CLK, VTO, SDA, SCL
Dimension	Sensor board: 2.65mm diameter Main board: 2.65x3mm

Application Block Diagram

1. PC Display

muC301 — OV420 | OV538 — USB2.0 — PC/NB
C3842

2. Desktop TV display

muC301 — OV420 | DSP — AV — TV
C6203
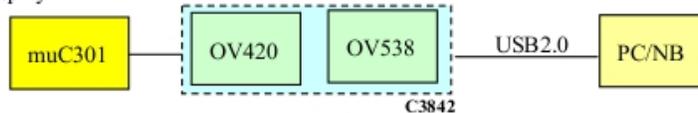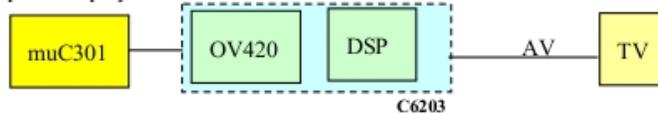
3. Portable/handheld TFT display

muC301 — OV420 | DSP | TFT
C9203
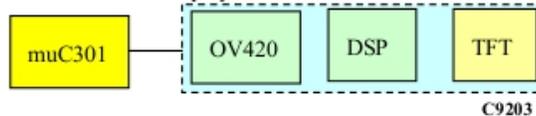
Introduction

This module has been designed to interface the micro camera muC301. Real time video is displayed on the TFT panel. It performs still image capture and video recording, store files to SD card. It is good for portable and handheld application.

Key Features

- ✓ Interface to muC301
- ✓ Real time Video output
- ✓ Support TFT panel size 3.5"
- ✓ RTC, OSD
- ✓ Manual capture JPG/AVI
- ✓ Image resolution 384*384
- ✓ Frame rate: 30fps
- ✓ Store to SD card, up to 16G
- ✓ Mass storage

System Block Diagram
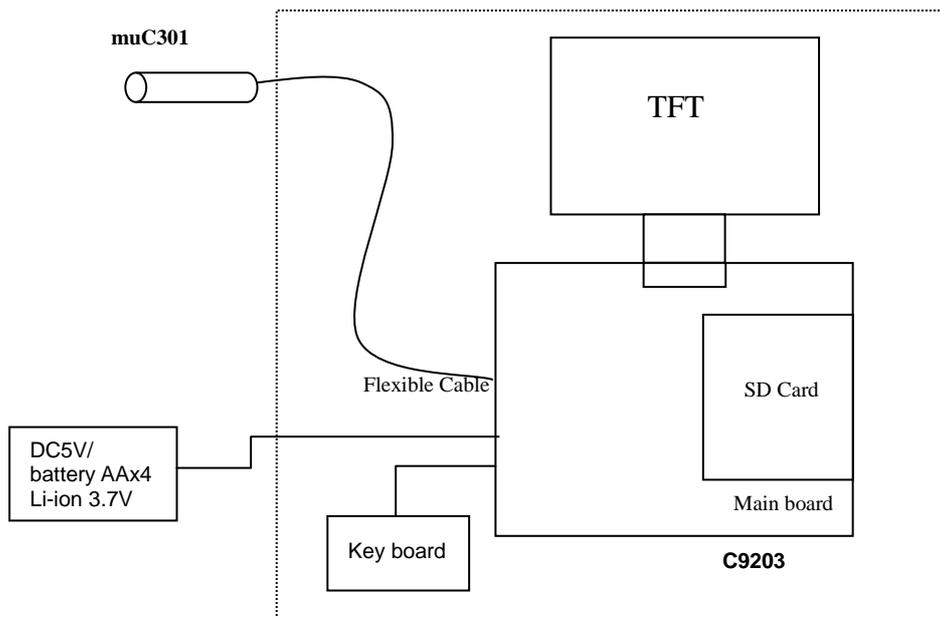
Keyboard Design

8- Key design: power/mode/menu/UP/DN/LF/RT/OK

1. Power: power on/off the module
2. Mode: toggle playback or preview
3. Menu: for setup or quit the setup
4. LF/RT/UP/DN for item select
5. OK to confirm
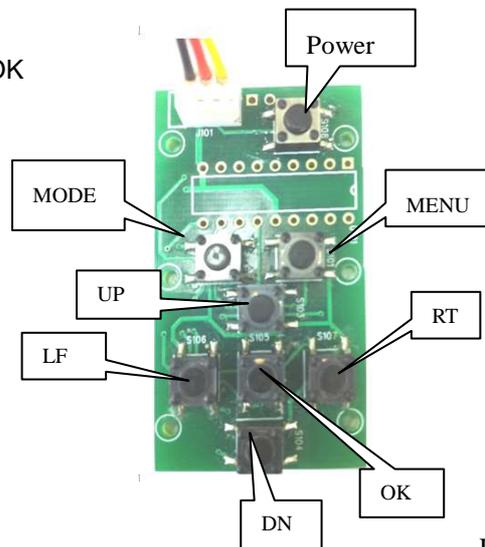
Module Specifications

Board Dimension	72x60mm
Storage	External SDHC card up to 16GB
Video Capture	384*384 (max 30 fps) Unlimited capturing time depends on available memory space
Photo Resolution	384*384 JPEG format
USB Interface	Mass storage mode USB 1.1
Power	DC 5V/AAx4/Li-ion 3.7V

Electrical Characteristics

Parameter	Condition	Min.	Typ.	Max	Unit
Operation Voltage		3.7	5	6	V
Operation current	Preview	220	230	238	mA
	Capture JPG (Peak @ capturing)	223	235	240	mA
	Capture AVI (Peak @ recording)	270	280	305	mA
	Playback	220	228	240	mA

Mechanical Dimension
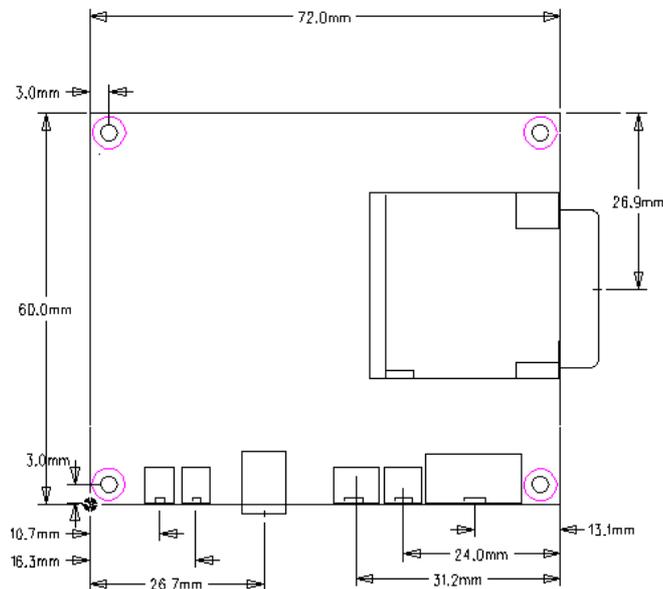
Keyboard Circuit

Setup summary

```
┌──────────────┐     ┌──────────────┐     ┌──────────────────────────────────┐
│ Preview menu │ ──► │ Video setup  │ ──► │ Contrast – low/medium/high       │
└──────────────┘     └──────────────┘     │ Color –low/medium/high           │
                                          │ Sharpness –low/medium/high       │
                                          └──────────────────────────────────┘

┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│ System menu  │ ──► │    Setup     │ ──► │  Date/Time   │
└──────────────┘     └──────────────┘     └──────────────┘
                                   │      ┌──────────────────┐
                                   └────► │ Factory default  │
                                          └──────────────────┘
                                   │      ┌──────────────┐
                                   └────► │   Version    │
┌──────────────┐     ┌──────────────┐     └──────────────┘
│ Delete menu  │ ──► │  Delete one  │
└──────────────┘     └──────────────┘
              │      ┌──────────────┐
              └────► │  Delete all  │
                     └──────────────┘
```
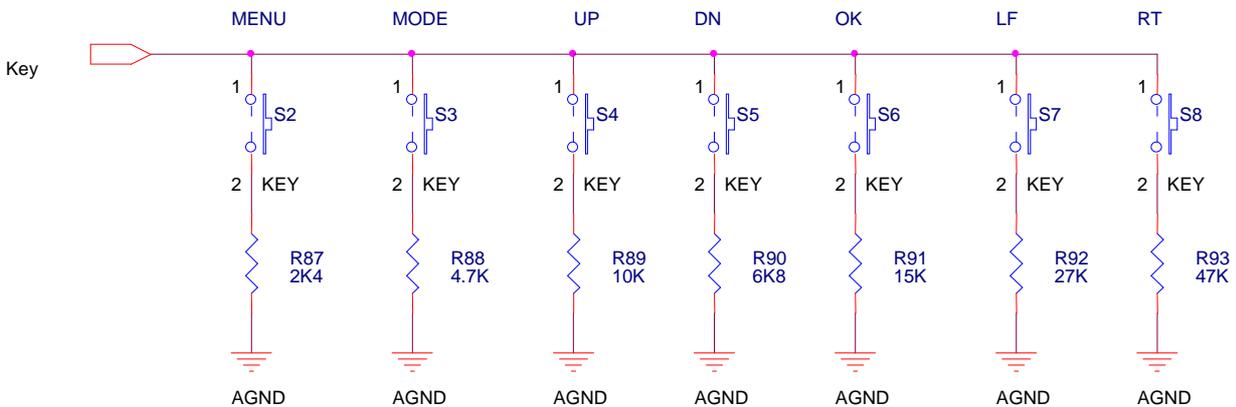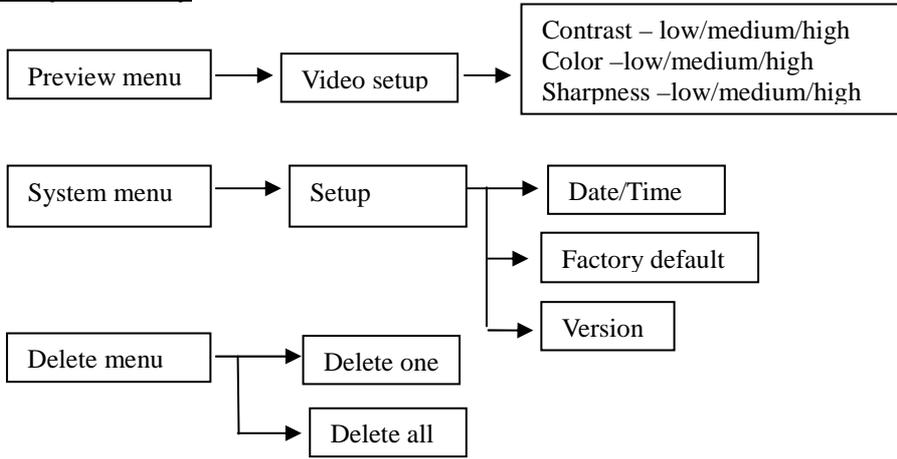
Operation:

On-off the module
Press once PWR key, the module will power on. By default it enters preview mode. Note the module need to have the SD card for image recording. It will display a "?" logo if the card is not presented. It does not support hot plug.

Preview mode
1. Press MODE to toggle between preview mode and playback mode.
2. Press LF to take a JPG picture.
3. Press RT to start recording AVI, press it again to stop recording. When memory is full, it will show "Memory Full".
4. Press UP to turn OSD on and off.

Menu
Press Menu key to enter parameter setup. Use UP/DN to select item, LF/RT to toggle value. Text in red means the current setting. Press Menu again to exit

1 VIDEO
    1.1   Contrast: low/medium/high. By default it is set to Medium
    1.2   Color: low/medium/high. By default it is set to Medium
    1.3   Sharpness: low/medium/high. By default it is set to Medium
    1.4   Exit: press ok, save the setting and quit this menu. If it is not exit properly, the setting will not be stored.

```
┌────────────────────────────────────────┐
│ INPUT SETTING -VIDEO                    │
│                                         │
│ CONTRAST – LOW/MEDIUM/HIGH              │
│ COLOR –LOW/MEDIUM/HIGH                  │
│ SHARPNESS –LOW/MEDIUM/HIGH              │
│                                         │
│                                         │
│ EXIT                                    │
└────────────────────────────────────────┘
```
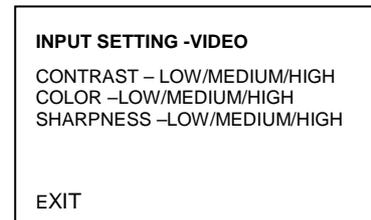
Playback Operation
1. Press mode to toggle between preview mode and playback mode.
2. Files are displayed in thumbnail of 6 photos. Press LF/RT to move to previous or next file, press OK to display current file in full screen.
3. When file is selected, press UP to turn OSD on and off. Press OK to start playing AVI.
4. At playing AVI, LF for backward, OK to stop. Use DN to pause/resume.
5. When backward playing, press RT to forward playing.
6. Delete file: press Menu to select delete one or delete all, confirmation is required.

```
┌─────────────────────────────────────────────┐
│  ┌─────┐     ┌─────┐     ┌─────┐             │
│  │     │     │     │     │     │             │
│  └─────┘     └─────┘     └─────┘             │
│  10/21/2010  10/21/2010  10/21/2010          │
│  09.00 0001  10.00 0002  11.00 0003          │
│  ┌─────┐     ┌─────┐     ┌─────┐             │
│  │     │     │     │     │     │             │
│  └─────┘     └─────┘     └─────┘             │
│  10/21/2010  10/21/2010  10/21/2010          │
│  12.00 0004  13.00 0005  16.00 0006          │
│           PICT0006.AVI                       │
└─────────────────────────────────────────────┘
```
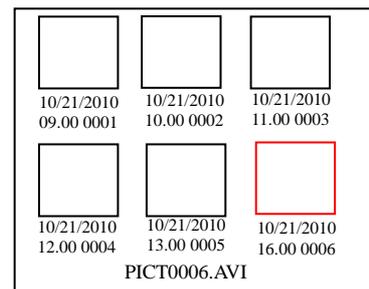
Menu
1. Use UP/DN key to select, use OK to confirm select
2. Sub-menu will prompt for confirmation when deleting. Always set default value to Cancel, use UP/DN to move cursor, OK to confirm and quit.
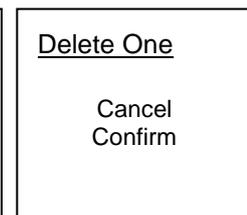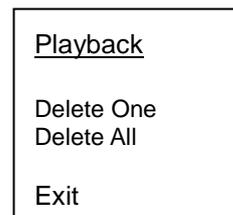
Note: all files are saved under the folder called DCIM. The files will be saved under the sub-folder with the name of 100Coach, like PICT0001.JPG, PICT0002.AVI

```
┌──────────────────┐   ┌──────────────────┐
│ Playback         │   │ Delete One       │
│                  │   │                  │
│ Delete One       │   │      Cancel      │
│ Delete All       │   │      Confirm     │
│                  │   │                  │
│ Exit             │   │                  │
└──────────────────┘   └──────────────────┘
```

PC Connection
The module can be connected to PC thru USB port and perform as mass storage device. When connected, the display will show "PC Connected"

System Setup
1. Press and hold the MENU key for 5sec until enter system setup menu. Use UP/DN key to select, use LF/RT key to toggle the selection, use OK to confirm.
2. Setup
   2.1 Date Time: the system has built-in the real time clock, and time stamping to the image, enter the correct date time is essential for the system. Press OK to enter date time setting. Use UP/DN to increase/decrease digit, LF/RT to shift next field, OK to confirm.
   2.2 TV System: set NTSC or PAL.
   2.3 Factory default: recover factory default settings.
   2.4 Version: check current F/W version.

```
SETUP - SYSTEM

TV SYSTEM: PAL
DATE/TIME
FACTORY DEFAULT
VERSION

EXIT
```

```
DATE TIME

        YY MM DD
        2007 01 01
        HH MM SS
        12 : 00 : 00

EXIT
```

Keys Operation matrix

	Preview	Playback (Thumbnail)	Playback single file
Mode	Change to playback	Change to preview	Playback (thumbnail)
Menu	Enter setup Menu	Select file	Delete menu
UP	Turn on/off OSD	Previous 3 file	Turn on/off OSD
DN	-	Next 3 file	-
LF	Capture JPG	Previous file	Previous file
RT	Start/stop AVI	Next file	Next file
OK	-	Select current file	Start playing AVI

	Playing AVI	Set up Menu	Date time setting
Mode	playback mode	playback mode	playback mode
Menu	-	Quit menu mode	Quit menu mode
UP	Turn on/off OSD	Select item	Increase digit
DN	Pause/resume	Select item	Decrease digit
LF	Backward	Select setting	shift to previous
RT	Forward	Select setting	shift to next
OK	Stop	Confirm and quit	Confirm and quit