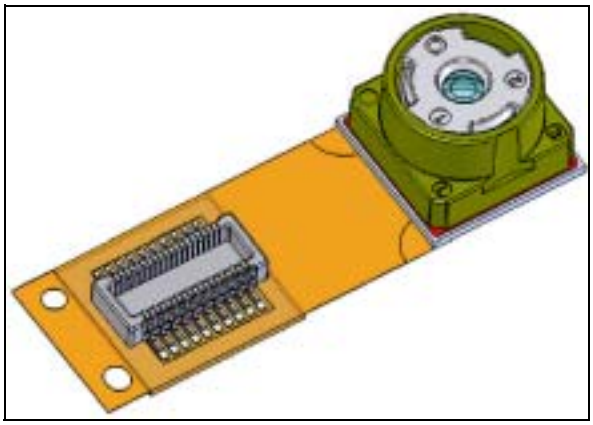
# VS6524

## VGA Mobile Camera Module

**DATA BRIEF**

### FEATURES

- 640H x 480V active pixels
- 3.6 µm pixel size, 1/6 inch optical format
- RGB Bayer color filter array
- Integrated 10-bit ADC
- Integrated digital image processing functions, including defect correction, lens shading correction, demosaicing, sharpening, gamma correction and color space conversion
- Embedded camera controller for automatic exposure control, automatic white balance control, black level compensation, 50/60 Hz flicker detection and cancelling, flashgun support
- Up to 30 fps progressive scan, subsampling and cropping to QVGA, QQVGA and subQCIF
- ITU-R BT.656-4 YUV (YCbCr) 4:2:2 with embedded syncs, RGB 565, RGB 444 or Bayer 10-bit output formats
- 8-bit parallel video interface, horizontal and vertical syncs, 24 MHz clock
- Two-wire serial control interface
- On-chip PLL, 6.5 to 27 MHz clock input
- Analog power supply, from 2.4 to 3.0 V
- Separate I/O power supply, 1.8 or 2.8 V levels
- Integrated power management with power switch, automatic power-on reset and power-safe pins
- Low power consumption, ultra low standby current
- Dual-element plastic lens, F# 2.8, 50° Horizontal field of view
- 7 x 7 x 4.5 mm fixed focus camera module with embedded passives
- 20-wire FPC attachment with board-to-board connector, 22 mm total length



### DESCRIPTION

The VS6524 is a VGA resolution CMOS color digital camera featuring low size and low power consumption and targeting mobile applications. The VS6524 is manufactured in 0.18 µm ST CMOS imaging process. It integrates a high-sensitivity pixel array, a digital image processor and camera control functions.

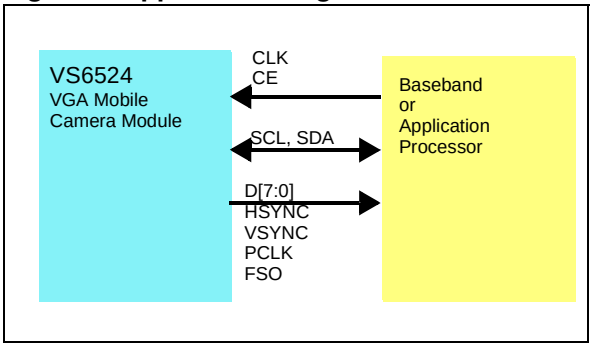
The VS6524 is capable of streaming VGA video up to 30 fps, with ITU-R BT.656-4 YUV 4:2:2 frame format. It supports both 1.8 V and 2.8 V interface and requires a 2.4 to 3.0 V analog power supply. Typically, the VS6524 can operate as a 2.8 V single supply camera or as a 1.8 V / 2.5 V supply camera. The integrated PLL allows for low frequency system clock, and flexibility for successful EMC integration. This complete camera module is ready to connect to camera enabled baseband processors, back-end IC devices or PDA engines.

The VS6524 package uses the second generation of SmOP2 packaging technology where the sensor, passives and lens are assembled in a fully automated test and focus process, allowing high volume and low cost production.

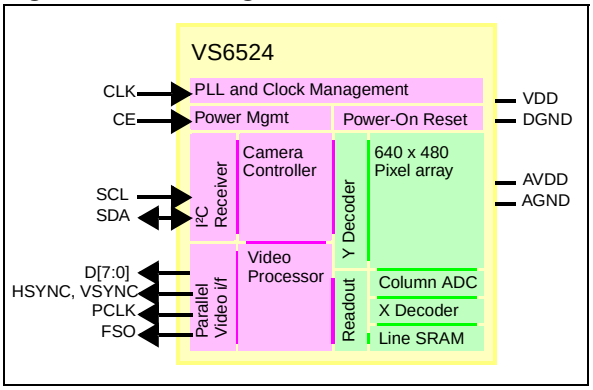
### APPLICATIONS

- Mobile phone
- PDA
- Videophone

### Figure 1. Application Diagram




### Figure 2. Block diagram




### Table 1. Technical Specifications

| | |
|---|---|
| Active pixels | 640H x 480V |
| Pixel size | 3.6 x 3.6µm |
| Array size | 2.38 x 1.77 mm |
| Color filter array | RGB Bayer |
| Exposure control | +120 dB |
| Analog gain | +24 dB (max) |
| Dynamic range | 61 dB (typical) |
| Signal-to-noise Ratio | 35 dB at 100 lux (typical) |
| Frame rate | 1 to 30 Hz |
| Image format | VGA, QVGA, QQVGA, subQCIF<br>Arbitrary cropping<br>Horizontal/vertical flipping |
| Pixel format | YUV 4:2:2<br>RGB 565, RGB 444<br>Raw Bayer 10-bit |

### Table 1. Technical Specifications

| | |
|---|---|
| Video Interface | 8-bit parallel video, hsync, vsync<br>ITU-R BT.656-4 compliant, 24 MHz max |
| Clock input | 6.5 to 27 MHz square<br>13 MHz typ. (on-chip PLL) |
| Supply voltage | 2.4 to 3.0 V analog |
| I/O voltage | 1.8 or 2.8 V +/- 0.1 V<br>CMOS levels |
| Power consumption | Streaming 30 fps: 30 mA max<br>Power down: 10 µA max. |
| Lens | 2-element, 50° HFOV, F# 2.8 |
| Depth of field | 20 cm to infinite |
| TV distortion | < 1% |
| Relative illumination | 45% typ. |
| Package type | SmOP2 |
| Package size | 7.0 x 7.0 x 4.5 mm (wlh) |
| System attach | FPC with 20-pin B2B connector, Molex 55560-0201 or equivalent[a] |

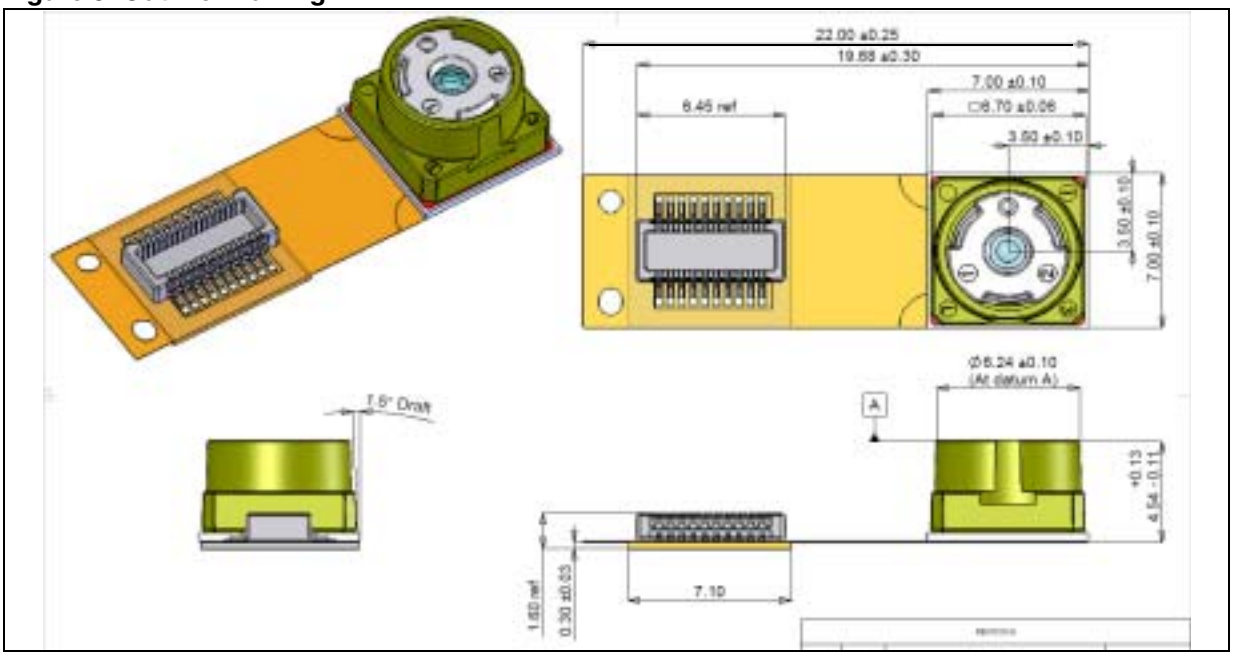
a. Contact us for custom FPC designs and/or ZIF connector variants

## PART NUMBERING

### Table 2. Order Codes

| Part Number | Description |
|---|---|
| VS6524P02S | SmOP2 7.0 x 7.0 x 4.5 mm<br>FPC attach, tray packing |

**Figure 3. Outline Drawing**




# REVISION HISTORY

**Table 3. Revision History**

| Date | Revision | Description of Changes |
|---|---|---|
| February 2005 | 1 | First Issue |
| February 2005 | 2 | Same content, format/layout reviewed. |