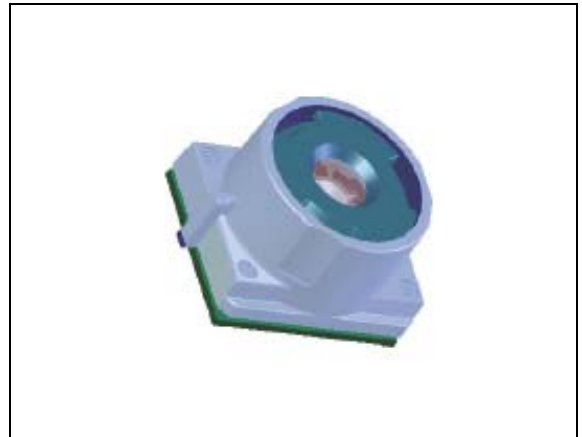# VS6590

0.5 Megapixel Camera Module

FEATURES

- SMIA[1] 1.0 profile 0 compliant image sensor
- 0.5 Megapixel resolution (800H x 600V)
- CCP 1.0 serial video interface
- Two-wire control port (CCI)
- On-chip PLL with 6.5 to 27 MHz system clock
- Up to 30 frame per second (fps) progressive scan with smooth frame rate control
- Horizontal downscale at x1, x1.5, x2.0, x2.5 and x3.0
- Operation from 2.4 V analog power supply
- Low EMI 1.8 V digital and I/O power supply
- 15 µW power down consumption
- 10-bit on-chip ADC
- Small size 1/4-inch lens fixed focus module
- Integral EMC shielding

DESCRIPTION

The VS6590 is a 0.5 Megapixel camera module for use across a range of mobile phone platforms. The electrical and logical interfaces to the camera module are SMIA 1.0 profile 0 compliant and are capable of generating 0.5 Megapixel images at up to 30 fps.

Based on the SMIA architectural concepts, the VS6590 can be used with or without image processor (e.g. STV0976). This camera module is suitable for performance-driven camera phones and cost-driven high volume designs. The embedded horizontal scaler typically enables the realization of power efficient viewfinder using host software processing. For performance driven applications, or when a different video interface is required, the STV0976 mobile imaging processor ensures state-of-the-art image reconstruction and compression of SVGA images at up to 30 fps.

The VS6590 features allow straightforward integration into mobile phone designs: low EMI video interface and package/socket shielding, low wire count (8 total), embedded power management with ultra low power-down current and embedded PLL. A minimal list of external components is required: supply decoupling capacitors, CCI pull-ups and a charge-pump capacitor.

The VS6590 2-element lens design ensures high quality image capture while maintaining low module height. The overall optical stack, including lens system, IR filter and sensor optical structures is developed within ST.

The VS6590 package uses the second generation of SmOP (Small Optical Package) packaging technology; sensor and lens are assembled in a fully automated test and focus process for high volume and low cost production. This 0.5 Megapixel sensor fits within a space efficient form factor (9.5 x 8.5 x 6.1 mm^3).

APPLICATIONS

- Mobile phone
- PDA
- Wireless security camera

Table 1. Order Codes

Part Number	Description
VS6590V02C/T2	SmOP2 22" tape and reel

1.Standard Mobile Imaging Architecture, visit www.smia-forum.org

Figure 1. VS6590 Application Diagram

Figure 2. VS6590 Block Diagram
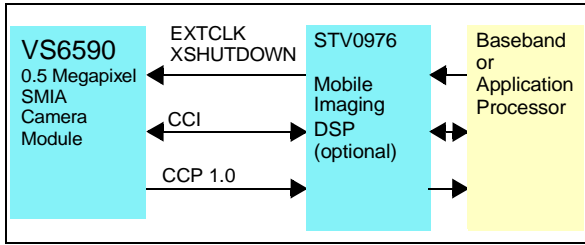

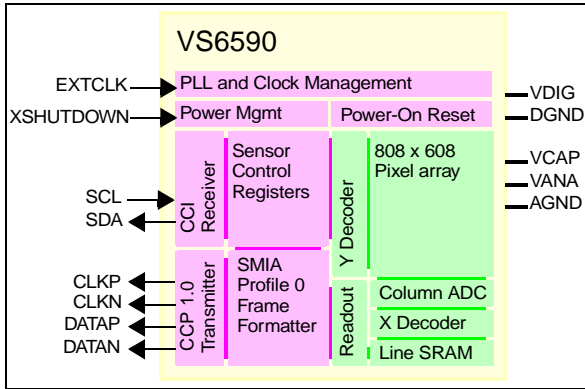## Figure 3. VS6590 Outline Drawing

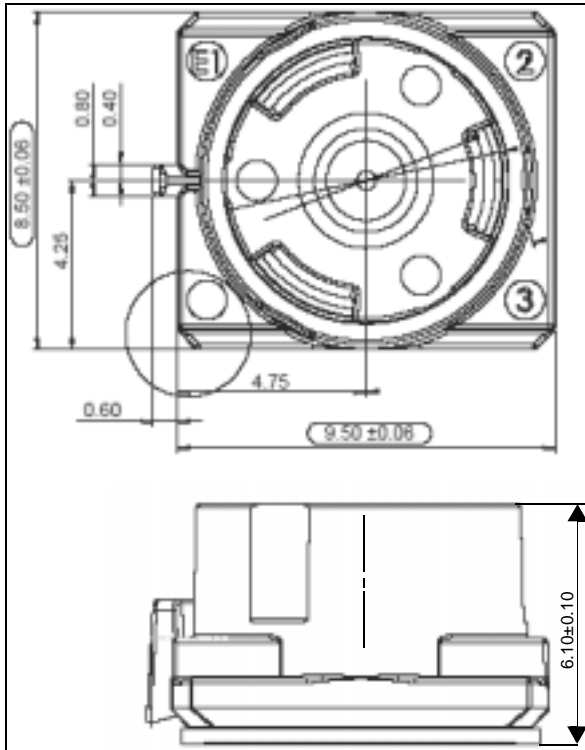## Table 2. Technical Specifications

Active pixels	800H x 600V
Pixel size	4.0 x 4.0 µm
Array size	3.232 x 2.432 mm^2
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
Frame rate	1 to 30 Hz (800H x 600V)
Pixel format	Raw Bayer 10-bit
Video Interface	CCP 1.0 High-speed serial 208Mbit/s 1.8 V LVDS
Clock input	6.5 to 27 MHz square 13 MHz typ. (on-chip PLL)
Supply voltage	2.4 to 2.9 V analog 1.8 V ± 0.1 V digital
I/O voltage	1.8 V CMOS levels
Power consumption	Streaming 30fps: 75mW max Power down: 15 µW max.
Lens	2-element, 44.5° HFOV, F# 2.8
Depth of field	50 cm to infinite
TV distortion	< |2%|
Relative illumination	37% typ.
Package type	SmOP2M
Package size	8.5 x 9.5 x 7.6 mm (wlh)
System attach	16-pin SMD socket with EMC shield

Table 3. Temperature Range

Storage	-40 to +85 °C
Functional operating	-30 to +70 °C
Normal operating	-25 to +55 °C
Optimal operating	+5 to +30 °C

REVISION HISTORY

Table 4. Revision History

Date	Revision	Description of Changes
October 2004	1	First Issue