

High-Resolution 2.2-Type QVGA (180 ppi) Low-Temperature Polycrystalline Silicon System-on-Glass TFT LCD Display for Cellular Phones

ACX342BKM

Sony has now developed the ACX342BKM 2.2-type QVGA (180 ppi) LCD module for cellular phones that achieves not only high color purity with a color NTSC ratio of 60% and the high brightness of 300 nit, but low power consumption (210 mW for backlight + LCD panel operation) as well.

For the ACX342BKM, Sony refined their system display technology that forms the whole LCD drive system on the glass substrate even further to achieve both high resolution and the highest level of optical characteristics at the same time. The result is an LCD display module that is optimal for mobile applications.

- 5.64 cm (2.2-type) QVGA system display
- High brightness and high color purity
- Low power consumption
- Single 2.9 V power supply operation
- 16-bit RGB digital interface circuit

■ System Display Technology

The ACX342BKM is an LCD module that includes Sony's independently developed system-on-glass technology, a technology that forms, as a single integrated unit, all the LCD drive circuits on the LCD panel using Sony's high-performance/high-reliability low-temperature polycrystalline silicon TFT devices. This technology can incorporate, on the glass itself, all of the RGB interface and drive circuits, including a supply voltage generating circuit (DC/DC converter) that can operate from

a single 2.9 V power supply, a 16-bit RGB digital interface circuit, reference drivers, a timing generator, VCOM drivers, a VCOM adjustment circuit, and other power supply system circuits. (See figure 1.) This system-on-glass technology makes it possible to drive the display by mounting just 12 capacitor and resistor components on the flexible PC board (FPC) and also achieves high reliability by reducing the number of connections required.

■ High Brightness and High Color Purity

By making the oxide film in the transistor circuit thinner in a process technology, Sony achieved a significant reduction in the surface area of the pixel internal Cs (supplementary capacitor) block. This allowed Sony to achieve an extreme high aperture ratio in the ACX342BKM, despite the fact that it has the extremely fine resolution of 180 ppi in a 5.64 cm (2.2-type) QVGA display. By combining this display with a high-intensity backlight, Sony achieved a brightness level increased to 300 nit.

The use of color filters that were optimized for the spectral characteristics of the white LED backlights made it possible for Sony to achieve both higher transmittance and higher color purity at the same time. This means that the ACX342BKM achieves both the high brightness of 300 nit and at the same time, an extremely

wide color reproduction with a color NTSC ratio of 60%. (See photograph 1.)

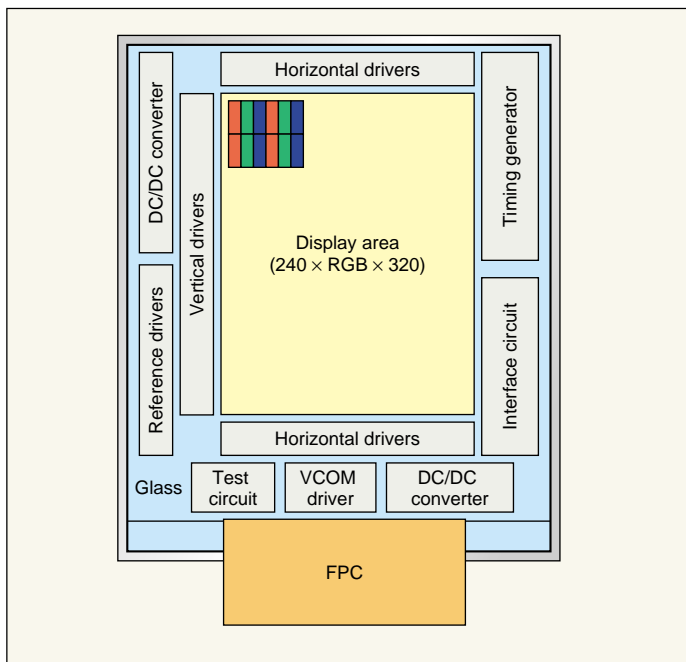
■ Low Power Consumption

At the same time as achieving the industry's highest level of optical characteristics, namely a brightness of 300 nit and an NTSC ratio of 60%, by adopting the system display, process, and high-brightness backlight technologies described above, Sony was also able to achieve the low power of 210 mW (with the backlight on and the full display operating). This corresponds to a roughly 33% reduction when compared to earlier system display LCD modules that have the same characteristics. (See figure 2.)

This reduction in power consumption can contribute to reduced battery drain in end products. Thus the ACX342BKM is an LCD module that is truly optimal for mobile applications.

V O I C E

We refined Sony's system display and process technologies, which have been evolving daily, even further and incorporated the appeal of those technologies into our latest development, the ACX342BKM. We packed both Sony's leading-edge technologies and the efforts of all the team members into the simple structure of this device, and were able to create a device that not only achieves superb picture quality and characteristics, but also achieves high reliability as well. I hope you will come to appreciate the appeal of this device.



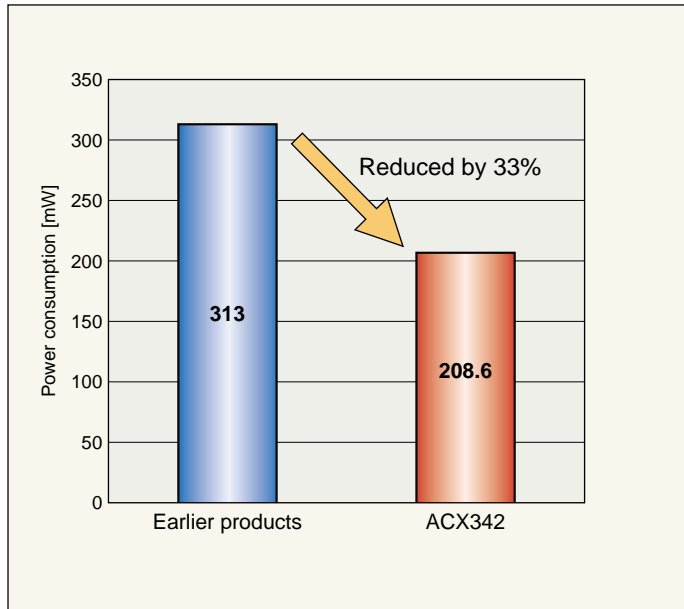
■ Figure 1 Drive Circuit Block Diagram

■ Table 1 Main Characteristics

Number of pixels	240 × 320 (QVGA)
Diagonal size	5.64 cm (2.2 type)
Resolution	180 ppi
Pixel pitch	141 μm
Display mode	Transmissive TN mode
Interface	RGB 16 bits
Number of colors	65,536 colors
Supply voltage	2.9 V
Interface voltage	2.9 V
Power consumption (with the backlight on)	210 mW
Brightness	300 nit
NTSC ratio	60%



■ Photograph 1 Display Example



■ Figure 2 Power Consumption Comparison