Low Temperature Polycrystalline Silicon 6.9 cm (2.7-type) 1/8 VGA Color Reflective LCD Module with Built-in Low-power 3-bit D/A Converter

ACX705AKM

The switch to color displays in portable information terminals (PDAs) and multifunction portable communication terminals is proceeding rapidly.
Sony has now developed the ACX705AKM 2.7-type 1/8 VGA color LCD module for these markets, which desire high-picture quality and low power. This device achieves the industry's highest level of display performance by using Sony's low temperature polycrystalline silicon reflective LCD technology.
This device achieves high-picture quality, low power (47 mW), and ease of use (20-pin interface) in a full module form that includes an LCD panel with a built-in low-power consumption 3-bit D/A converter, system ICs (controller IC and driver IC), a drive board that includes a DC-DC converter, and a highly efficient LED front light.

- **1/8 VGA color reflective LCD module**
- **240 × RGB × 160 stripe arrangement**
- **TFT panel with built-in 3-bit D/A converter**
- **Module includes a drive board that mounts the controller IC, driver IC, and DC-DC converter.**
- **Built-in high-efficiency low-power consumption LED front light**
- **20-pin interface**
- **Low power: 47 mW (module total)**

As the trend towards the use of color in portable terminal display gains momentum, the aspects that are most desired in LCD modules are high-picture quality, low-power consumption, and miniaturization (including thinner and lighter weight). To respond to these desires, Sony has always approached color reflective LCD development by stressing basic performance. Following the development of a 3.8-Type product*1, Sony has now developed a 2.7-Type model to add to the product line.

V O I C E

The ACX705AKM features an extremely ease-to-use size that can be used not only in products for the rapidly growing PDA and multifunction communication terminal markets, but also in a wide variety of products limited only by your imagination. I strongly urge you to try this device. We are hopeful that the market for color LCDs for portable equipment will grow rapidly due to Sony's LCD technology. Furthermore, this newly-developed panel featuring a built-in D/A converter represents the first step towards the achievement of "system-on-glass" technology, and that Sony is committed to continued development of this concept.

With this product, Sony continues to lead the world in portable terminal color displays.

Full Module Form

The ACX705AKM of this release is a full module product that unifies an LCD panel, a drive board, and a front light in a single unit. The drive board mounts ICs and a DC-DC converter. Since the ACX705AKM is a full module product, a 20-pin interface can be used, no power supply needs to be provided, and adjustment is unnecessary. Thus this product achieves the maximum in ease of use and at the same time achieves low-power operation with a total power consumption of 47 mW. (See figure 1.)

A High-picture Quality, Low-power Consumption Panel

The ACX705AKM LCD panel uses Sony's unique circuit technology and Sony's low temperature polycrystalline silicon TFT technology and includes a built-in 3-bit D/A converter to achieve high-picture quality, ultralow-power consumption (10 mW for the panel itself), and a narrow frame. (See figure 2.) This panel achieves high contrast ratio (panel: 35:1 typical) by adopting an advanced BDM*2 retardation film*1 that was designed for optimal optical properties, and achieves a high reflection ratio (panel: 34% typical) by adopting the RMP (Random Multi Profile*1) structure, and thus can respond to needs for high-picture quality.

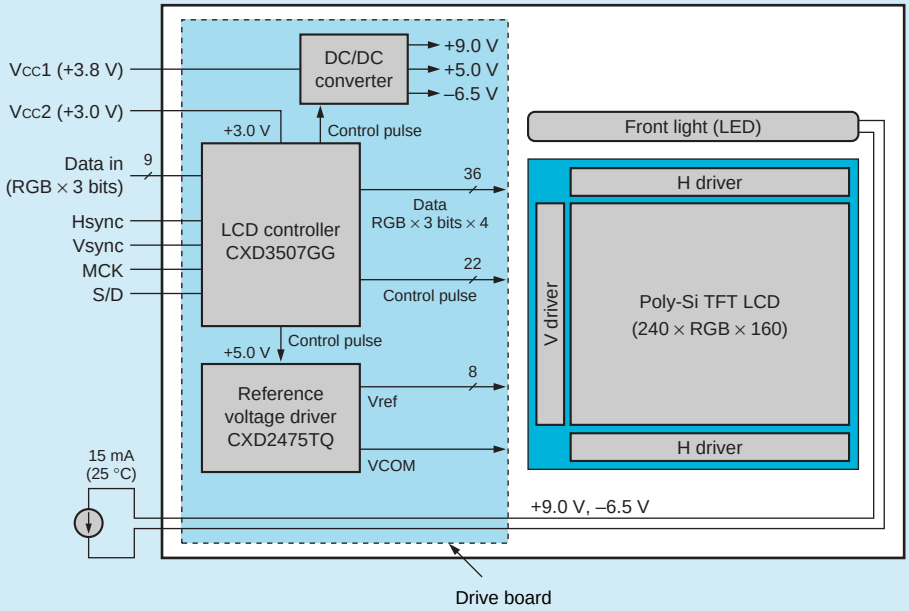
Drive Board with System ICs and High-efficiency LED Front Light

The ACX705AKM drive board mounts the newly-developed CXD3507GG controller IC and the CXD2475TQ driver IC, and a DC-DC converter that supplies the power required for panel and driver IC drive. All of the components used on this board were designed for thin-form mounting, and thus the board supports end product miniaturization. The front light system uses white LEDs as the light source and by adopting a highly efficient light guide, achieves both adequate brightness (6 cd/m^2) for work in dark environments and low current (15 mA) drive. Sony is committed to responding to our customers' needs not only with panel-only products, but with full module type products such as this, the ACX705AKM. (See figure 3.)

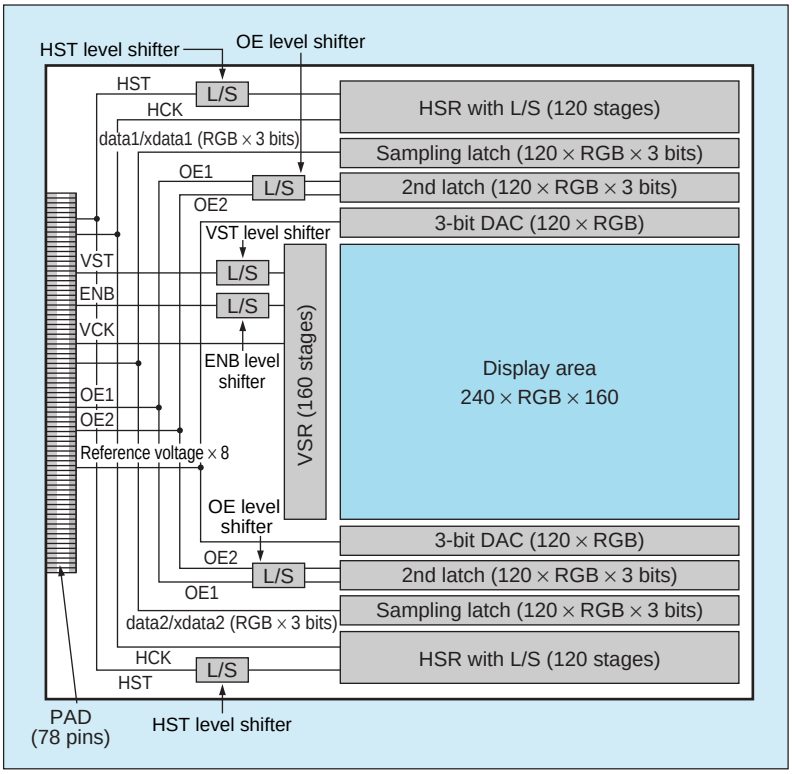
*1: See Sony Cx-News, Volume 20.
*2: Birefringence Dispersion Matching

New Products

Pin No.	Symbol
1	$V_{CC}1$
2	$V_{CC}1$
3	GND
4	GND
5	R0
6	R1
7	R2
8	G0
9	G1
10	G2
11	B0
12	B1
13	B2
14	Hsync
15	Vsync
16	S/D
17	MCK
18	$V_{CC}2$
19	LED V_{DD}
20	LED GND



■ **Figure 1 Module Block Diagram**



■ **Figure 2 Panel Block Diagram**

■ **Table 1 ACX705AKM Basic Specifications**

Parameter	Preliminary specification
Module configuration	LCD + F/L + drive board (2 ICs and a DC/DC converter)
Screen size	57.6 mm (W) × 38.4 mm (H): Diagonal 6.92 cm (2.7-type)
Angle of view	3 : 2
Number of effective dots	1/8 VGA (240 (H) × RGB × 160 (V)) 115.2 K dots
Contrast	No F/L models: 30:1 (typ.) F/L models: 15:1 (typ. F/L off)
Reflection ratio	30% (typ.)
Number of colors	For each of RGB: 3 bits (512 colors)
Frame frequency	75 Hz
Supply voltage	DC/DC converter: 3.8 V (typ.) Controller: 3.0 V (typ.)
Power consumption/ brightness	47 mW (typ. F/L excluded) F/L: 100 mW @ 6 cd/m^2 (typ.)
Panel dimensions	66.30 mm (H) × 45.44 mm (V)
Module dimensions	71.4 mm (W) × 52.0 mm (H) × 4.9 mm (t) (Max. 6.5 mm (t))
Operating temperature	–10 to +60 °C
Storage temperature	–30 to +70 °C

F/L: front light