



HX8301A

528 channel, 262144 color TFT
source driver with internal GRAM

May 2003, Version 1.0

1. General Description

The HX8301A, 528-channel source driver with internal GRAM is used in combination with the gate driver/power-supply IC (HX8609A) for maximum 176RGB-by-240-dot graphics on TFT displays in 262,144 colors.

The HX8301A's graphics-operation function, 8/9/16/18-bit high-speed bus interface, and high-speed GRAM-write functions enable the efficient transfer of data and the high-speed rewriting of data in the graphics GRAM (GRAM). The HX8301A's 6/16/18-bit RGB interface (VSYNC, HSYNC, ENABLE, and PD 17 to 0) and VSYNC interface(system interface + VSYNC) provide interfaces for use with animated displays. These interfaces provide a window-addressing function that facilitates the construction of a display in any area of the screen and allows the simultaneous display of animated images and the contents of internal GRAM without concern for the static image areas.

The HX8301A has various functions for reducing the power consumption of an LCD system and has a low-voltage operation (1.8V min.) with an internal GRAM to display a maximum of 176RGB-by-240-dot color. Since the HX8301A incorporates a circuit that interfaces with the HX8609A, it can set instructions for the HX8609A. In addition, moderate power control can be achieved by the software control, such as a partial display, 8-color display mode, sleep and standby modes. This LSI is suitable for any medium-sized or small portable battery-driven product requiring long-term driving capabilities, such as digital cellular phones that support a WWW browser, bi-directional pagers, and small PDAs.

2. Features

- 176RGB x 240-dot graphics display LCD controller/driver for 262,144 TFT colors (when used with the HX8609A gate driver LSI).
- System interfaces
 - 8-/9-/16-/18-bit high-speed bus interface
 - Serial data transfer interface.
- Interface for use with animated display
 - 6-/8-/18-bit RGB-I/F (VSYNC, HSYNC, DOTCLK, ENABLE, and PD17 to 0)
 - VSYNC-I/F (system I/F + VSYNC)
- High-speed burst-GRAM write function.
- A window-addressing function allows writing in the set of address of GRAM that correspond to a window's shape.
 - The interfaces for animated displays facilitate the placing of animated pictures in any area of the screen.
 - Selective transmission to the animated-display area reduces the amount of data transmitted.
 - The contents of internal GRAM may be displayed at the same time as the animated display.

- Bit-operation for graphics processing:
 - Write data mask in bit unit.
 - Conditional writing in pixel unit.
- Various color-display control functions:
 - 262,144 possible colors can be displayed at the same time (γ -adjustment function).
 - Vertical scrolling in a line unit.
- Low-power consumption architecture supports:
 - $V_{cc} = 1.8$ to 3.3 V (corresponding low-voltage operation).
 - $DDVDH = 4.5$ to 5.5 V (liquid crystal driving voltage).
 - Power-save functions such as the standby mode and sleep mode.
 - Partial LCD drive of two display windows in any position.
 - Maximum 6-times step-up circuit for liquid crystal drive voltage (HX8609A).
- Built-in circuit for interfacing with the HX8609A gate driver/power-supply IC.
- Internal GRAM capacity: 95,040 bytes.
- 528-channel liquid crystal display driver embedded.
- n-line AC liquid-crystal display drive (can be set to a different polarity each line).
- Internal oscillation and hardware reset.
- Reversible direction to the source driver.