HX8609A

240 Channel TFT Gate Driver with Internal Power IC

April 2003, Version 1.0

1. General Description

HX8609A is a gate-driver IC for using in systems with color-TFT-liquid-crystal dot-matrix graphic displays. It incorporates a circuit for driving 240 channels of TFT gate-line driving and all the power-supply circuits that are required for liquid crystal displays, and realizes the liquid crystal display by adding external capacitors.

When used with the HX8302A 396-channel source driver with internal RAM, and used with the HX8301A 528-channel source driver with internal RAM, this LSI is suitable for color TFT displays of cellular phones having 132-by-176 and 176-by-240 pixels, respectively. The LSI has functions such as instruction setting from source driver, internal step-up circuit, op-amp circuit, micro-adjustment of power output etc., and is suitable for midium-small potable machine such as mobile phone, small-size PDAs.

2. Features

- TFT gate-line driving circuits
  — 240 outputs

- The driving timing suitable for configuration of TFT structure in display
  — Cst structure (Cs-on-common TFT structure)

- 2 Vcom output voltages : Vcom and Vcom2 which is alternating between VcomL , VcomH and VcomL2 , VcomH2.

- Alternating driving for TFT-display common-electrode power supply
  — N-line alternating drive of Vcom
  — Adjustment of Vcom amplitude : internal 22-level digital potentiometer.
  — Adjustment of Vcom high voltage : internal 30-level digital potentiometer / externally adjusted by variable resistor.

- The instruction transfer for mode setting
  — Serial transfer from the HX8301A/8302A source driver

- Low-power consumption operation
  — Controlling function for the switching performance of step-up circuits and operational amplifiers

- Input power-supply voltage
  — Vcc – GND = 1.8 ~ 3.3 V (Power supply for logic circuit)
  — Vci – GND = 2.5 ~ 3.3 V (Power supply for analog circuit)

- Power-supply voltage for liquid crystal(LC) driving
  - DDVDH – GND = 4.0 ~ 5.5 (V) (Driving for source driver liquid crystal output circuit / Driving for Vcom output)
  - VGH – GND = 9.0 ~ 16.5 (V) (Driving for gate driver)
  - VGL – GND = -4.0~ -14.0 (V) (Driving for gate driver)
  - VCL – GND = 0 ~ -3.3 (V) (Driving for VcomL , VcomL2 output)

- Output voltage level
  - VDH – GND = 3.0 ~ (DDVDH-0.5) (V) (Reference power supply for source driver grayscale voltages)
  - Vcom(2) – GND (Using for common voltage level)
    - VcomH(2) = 3.0 ~ (DDVDH-0.5) (V) (High-level common voltage in alternating driving)
    - Vcom L(2) = VCL + 0.5 ~ 1.0 (V) (Low-level common voltage in alternating driving)
    - Vcom(2) amplitude (VcomH(2)-VcomL(2)) = 6 (V) max.

- Internal step-up circuit output
  - DDVDH :VciOUT × 2
  - VGH :VciOUT × 6
  - VGL :VciOUT × -4 , -5
  - VCL :VciOUT × -1

3. Block Diagram

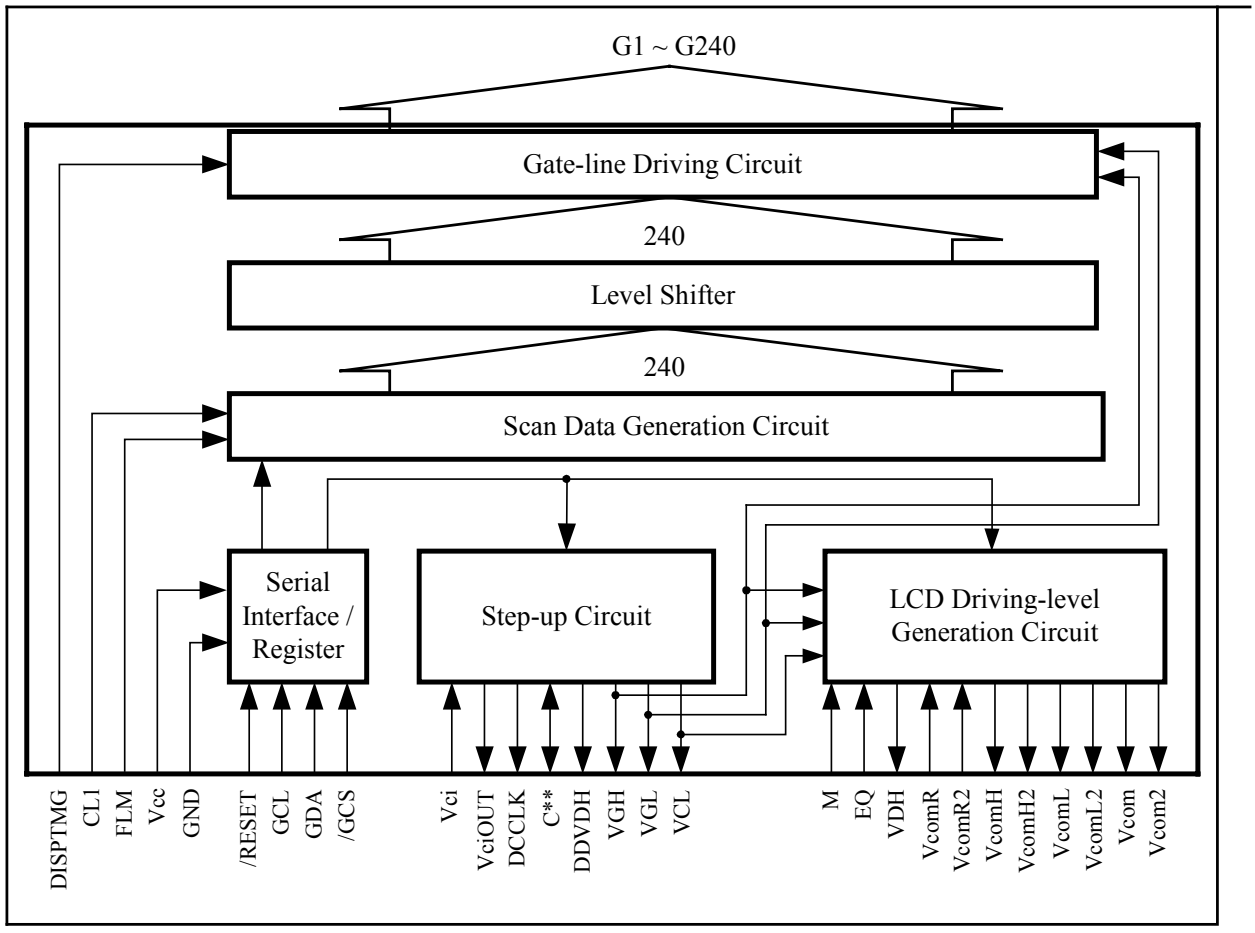

Figure 1. Block Diagram