Hitachi Releases HD66770/HD66771/HD667P00 Controller Driver Chip Set for TFT Color LCDs in Mobile Phones, etc.

—Large 132 × 176-pixel screen and 65,536-color display capability, together with the same low level of power consumption as STN color liquid crystal displays—

Tokyo, May 17, 2001—Hitachi, Ltd. (TSE: 6501) today announced the HD66770/HD66771/HD667P00 graphics display LCD controller driver chip set for TFT color LCD panels installed in digital mobile phones and similar products. Sample shipments will begin in June 2001 in Japan.

This chip set supports 132 × 176-pixel TFT color LCD panels--the industry's largest class of display screen size for mobile phone use--and offers 65,536-color display capability. It also provides the same low level of power consumption as STN color liquid crystal displays, making it ideal for mobile phone systems featuring high picture quality together with low power consumption.

Digital mobile phones are rapidly becoming widely used as data communication terminals handling information distribution services such as e-mail and WWW contents. The current capability of color display of still images will extend to a demand for a greater range of colors and sharper, higher-quality screens that can handle smooth, high-speed display of moving pictures. This trend is bringing increasing use of TFT LCD panels offering high picture quality, suitable for moving picture display, in preference to the current mainstream STN LCD panels. This in turn has brought a growing demand for sophisticated driver LSIs to drive TFT LCDs for mobile phones, together with a call for lower LCD panel power consumption.

Against this background, Hitachi is now releasing a TFT LCD panel chip set comprising the HD66770, HD66771, and HD667P00, to meet the market demand for large screens, high picture quality, and moving picture capability. The products in this chip set are as follows:

(1) HD66770: A 396-output source driver, incorporating display buffer memory supporting 65,536 colors and a display controller
(2) HD66771: A 228-output gate driver
(3) HD667P00: A power supply LSI for generating the liquid crystal drive voltages supplied to the source driver and gate driver

Use of this chip set makes it possible to provide a 132 × 176-pixel large-screen display and 65,536-color display. In addition, an 8-color display mode is included for primary-color display as a means of reducing power consumption. This function enables current dissipation to be held down by halting unnecessary tone level power supply in 8-color display. As a result, power consumption, including the panel, has been held to the same low level as color STN LCD panel displays, at 5 mW for 65,536-color display and 3 mW for 8-color display.

To reduce power consumption during normal operation, a partial display function is provided that enables only a part of the screen display area to be driven. The upper and lower display areas can be driven independently, enabling display to be performed with a lower LCD drive duty*[1]. For example, when displaying seven lines of icons at the top of the screen and 17 message lines in the center, both displays can be driven at a duty of 1/24, reducing the TFT panel charge/discharge current.

A high-speed burst RAM function is incorporated for writing data to the display RAM, enabling processing to be performed at a maximum speed of 160 Mbps. This makes it possible to write large quantities of data, such as color image data, and to achieve high-speed display rewriting for moving picture display. Also provided is an external VSYNC synchronization function, especially useful for moving picture display, which allows photographic images to be displayed on an LCD screen in synchronization with a signal from a camera built into a mobile phone, for example, ensuring smooth image display.

Supported mounting methods are COG*[2] mounting, in which the device is directly mounted face-down on the LCD glass, COF*[3] mounting, in which the device is mounted face-down on a flexible film substrate, and custom TCP*[4] mounting.

Hitachi plans to further expand the product lineup in the future to provide support for even larger screen sizes.

Notes:1. LCD drive duty: Ratio of the drive time for a single line on an LCD screen to the time for one frame of which the line is a part.

2. COG (Chip On Glass): A mounting method in which a die with a gold bump is directly mounted face-down on the LCD glass.
3. COF (Chip On Film): A mounting method in which a die with a gold bump is directly mounted face-down on a flexible film substrate.
4. TCP (Tape Carrier Package): A package in which the chip is mounted on a thin-film tape. Ultra-thin type mounting is possible.

< Typical Applications >

- Mobile phones handling e-mail and WWW content services
- Mobile phones supporting high-speed data transfer (W-CDMA, GSM, etc.)

< Prices in Japan > (For Reference)

Product Code		**Shipment Form**	**Sample Unit Price (Yen)**
HD66770	HCD667A70BP	Die with gold bump (straight layout)	1,800
	HCD667B70BP	Die with gold bump (staggered layout)	1,800
HCD66771BP		Die with gold bump	600
HCD667P00BP		Die with gold bump	600

[Supplementary Information]

< Specifications >

Item	**HD66770 Specifications**
Display size	132 × 176 pixels, 65,536 colors
Number of outputs	396 source outputs
Display RAM size	46,464 bytes
Display functions	• Window address function (rectangular RAM address area writing) • Split-screen partial display function (screen division at arbitrary line) • 8-color display mode
Bit operation functions	• Write data mask function (bit units) • Bit operation function (pixel units) • Specified color comparison drawing decision function
LCD drive duty	1/16 to 1/176 (programmable in 8-line units)
Interface	68/80-type 8/16-bit bus Clock synchronous serial interface support dedicated serial interface for HD66771 and HD667P00
Write cycle	100ns (3V power supply voltage)
Logic power supply voltage	1.8 V to 3.3 V
LCD drive voltage	4.5 V to 5.5 V
Shipment forms	• Die with gold bump (for COF or COG mounting) • Custom TCP

Item	**HD66771 Specifications**
Number of outputs	228 gate outputs
Interface	Dedicated serial interface
Logic power supply voltage	1.8 V to 3.3 V
LCD drive voltage	±9 V to ±16.5 V
Shipment forms	• Die with gold bump (for COF or COG mounting) • Custom TCP

Item	**HD667P00 Specifications**
Interface	Dedicated serial interface
Logic power supply voltage	1.8 V to 3.3 V
Step-up circuit	5× to 9× , polarity inversion Power supply output for source driver: 4 V to 5 V Power supply output for gate driver: ±9 V to ±16.5 V
Shipment forms	• Die with gold bump (for COF mounting) • Custom TCP