

Renesas Releases Single-Chip TFT Controller/Driver for Mobile Phone QVGA-Size TFT Color Liquid Crystal Displays

Renesas Technology Corp. today announced the R61505 controller/driver, providing QVGA (240 x 320-pixel) resolution screen drive and 260k-color display capability plus nonvolatile memory in a single chip, as a driver for amorphous TFT color liquid crystal display panels used in mobile phones. Sample shipments will begin in July 2005 in Japan.

The R61505 offers the following features:

- (1) QVGA-size screen drive capability with a single chip, enabling implementation of low-power-consumption LCD panels
QVGA-size screen drive has previously been implemented with two kinds of Renesas Technology chips. The R61505 enables single-chip implementation, and offers 260k-color display capability. Use of the R61505 reduces the number of component parts required, enabling lower LCD panel module costs to be achieved.
In addition, single-chip implementation and display drive circuit improvements have reduced power consumption by approximately 20% compared with the previous two-chip configuration, enabling low-power-consumption LCD panel modules to be produced.
- (2) On-chip nonvolatile memory enabling image quality adjustment data and ID code storage
The R61505 incorporates EPROM (Erasable and Programmable Read Only Memory) based write-only nonvolatile memory. Storing a destination ID code for panel product shipment processing, data for image quality adjustment, and so forth, in this memory makes it possible to cut back on externally-connected memory, enabling lower-priced LCD panel modules to be produced.
- (3) Smaller chip short sides for panels with narrower frames
Chip short sides have been kept down to 2 mm or less in size, contributing to the implementation of narrow-framed LCD panels for mobile phone use.

As mobile phone applications expand into such areas as high-resolution cameras, TV display functions, and game functions, larger volumes of display information are being handled and main screen resolution is improving to provide high-quality image displays, leading to increased use of the 240 x 320-pixel QVGA size. In addition, the trend in future LCD panels will be for wider viewing angles for improved image quality, and the narrowest possible frame.

Renesas Technology has previously used a two-chip configuration, comprising a source driver chip and a power supply and gate driver chip, for QVGA-size amorphous TFT color LCD panel products. However, the trend in LCD panel modules is toward even lower price together with performance improvements.

To meet these needs, Renesas Technology has employed its accumulated technological know-how to achieve single-chip implementation in the shape of the new R61505 LCD controller/driver offering lower LCD panel module power consumption and costs.

Product Details

The R61505 provides single-chip drive of a 240 x 320-pixel resolution QVGA-size screen. It has

approximately 172 Kbytes of on-chip display RAM and offers 260k-color display capability, enabling high display quality to be achieved. QVGA-size class screen display previously commonly handled by a two-chip configuration can be performed by a single R61505 chip, enabling fewer parts to be used and LCD panel modules to be made less expensive.

The provision of on-chip 10-bit write-only nonvolatile memory makes it possible to cut down on external memory previously used for storage of image quality adjustment data, a destination code for shipment management, and so forth, helping to reduce the cost of LCD panel modules.

The R61505 can also handle wider viewing angles. The trend in LCD panels is one of wider viewing angles to improve display quality, and the R61505 can support wide-angled panels with a wide LCD drive voltage range of 4.5 V to 6.0 V.

A hardware power supply sequencer is also incorporated that controls the LCD drive power supply startup sequence. There are a number of LCD drive power supplies, and the powering-on sequence of these power supplies has previously been entirely set by the user by means of a program. However, this has led to increased development times due to the occurrence of programming errors. With the R61505, an on-chip hardware sequencer handles the power supply startup sequence, and the program only contains a startup instruction for this sequencer, enabling user programming errors to be reduced and development efficiency to be improved.

The same 8-color display mode, standby mode, and deep standby mode as in previous products are provided as functions for reducing power consumption. Use of these modes makes it possible to achieve low current dissipation equivalent to that of a color STN LCD panel, helping to extend the battery life of mobile phones and similar devices.

Connection to a microcomputer is via an 8/9/16/18-bit high-speed bus interface, and a built-in high-speed burst RAM write function enables efficient data transfer. Image data interfaces include a new FMARK*2 interface in addition to the same RGB interface and Vsync*3 interface as currently used.

COG*4 is supported as the chip mounting method.

Future development plans include major extension of the product lineup to keep pace with evolving market needs, including the development of QVGA class models and on-chip nonvolatile memory models based on the R61505.

- Notes:**
1. QVGA : A display definition standard of 240 x 320 pixels
 2. FMARK : A signal output at the frame cycle signal (frame marker) output position in the frame alternation image drawing method
 3. Vsync (Vertical Synchronizing signal) : A signal for vertical timing when drawing a display screen
 4. COG (Chip On Glass) : A mounting method in which a chip with gold bumps is directly mounted face-down on the LCD glass substrate

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