

# UC1616

*Single-Chip, Ultra-Low Power  
128COM x 268SEG Matrix  
Passive LCD Controller-Driver*

## INTRODUCTION

UC1616c is an advanced high-voltage mixed-signal CMOS IC, especially designed for the display needs of low power hand-held devices.

This chip employs UltraChip's unique DCC (Direct Capacitor Coupling) driver architecture and FRM (Frame Rate Modulation) gray-shade modulation scheme to achieve near crosstalk free images, with well balanced gray shades.

In addition to low power COM and SEG drivers, UC1616c contains all necessary circuits for high-V LCD power supply, bias voltage generation, temperature compensation, timing generation and graphics data memory.

Advanced circuit design techniques are employed to minimize external component counts and reduce connector size while achieving extremely low power consumption.

## MAIN APPLICATIONS

- Cellular Phones and other battery operated palm top devices or portable Instruments

## FEATURE HIGHLIGHTS

- Single chip controller-driver for 128x268 matrix STN LCD with 4 gray shades and B/W Mode.
- A software-readable ID pin to support configurable vender identification.
- Partial scroll function and programmable data update window to support flexible manipulation of screen data.
- Support both page ordered and column ordered display buffer RAM access.
- Support industry standard 2-wire, 3-wire serial buses (S8, S9), and 8-bit, 16-bit parallel bus (8080 or 6800).

- Special driver structure and gray shade modulation scheme. Consistent low power consumption under all display patterns.
- Fully programmable Mux Rate, partial display window, Bias Ratio and Line Rate allow many flexible power management options.
- Four software programmable frame rates up to 66Hz. Support the use of fast Liquid Crystal material for speedy LCD response.
- Software programmable 4 temperature compensation coefficients.
- On-chip Power-ON Reset and Software RESET command, make RST pin optional.
- Self-configuring 10x charge pump with on-chip pumping capacitors. Only 3/5 external capacitors are required to operate.
- Flexible data addressing/mapping schemes to support wide ranges of software models and LCD layout placements.
- Very low pin count (9-10 pins with S8 or S9) allows exceptional image quality in COG format on conventional ITO glass.
- Many on-chip and I/O pad layout features to support optimized COG applications.
- $V_{DD}$  (digital) range (Typ.) : 1.8V ~ 3.3V  
 $V_{DD}$  (analog) range (Typ.) : 2.8V ~ 3.3V  
LCD  $V_{OP}$  range: 6.3V ~ 17.5V
- Available MTP trimming support precise LCD contrast matching.
- Available in gold bump dies  
Bump pitch: 24  $\mu\text{M}$   
Bump gap: 12  $\mu\text{M}$   
Bump surface: 1,800  $\mu\text{M}^2$

**ORDERING INFORMATION**

Part Number	MTP	I <sup>2</sup> C	Description
UC1616cGAA	Yes	No	Gold bumped die with MTP function

**General Notes****APPLICATION INFORMATION**

For improved readability, the specification contains many application data points. When application information is given, it is advisory and does not form part of the specification for the device.

**BARE DIE DISCLAIMER**

All die are tested and are guaranteed to comply with all data sheet limits up to the point of wafer sawing. There is no post wafer saw/pack testing performed on individual die. Although the latest processes are utilized for wafer sawing and die pick-&-place into wafer pack carriers, UltraChip has no control of third party procedures in the handling, packing or assembly of the die. Accordingly, it is the responsibility of the customer to test and qualify their applications in which the die is to be used. UltraChip assumes no liability for device functionality or performance of the die or systems after handling, packing or assembly of the die.

**MTP LIGHT SENSITIVITY**

The MTP memory cell is sensitive to photon excitation. Under extended exposure to strong ambient light, the MTP cells can lose its content before the specified memory retention time span. The system designer is advised to provide proper light shields to realize full MTP content retention performance.

**LIFE SUPPORT APPLICATIONS**

These devices are not designed for use in life support appliances, or systems where malfunction of these products can reasonably be expected to result in personal injuries. Customer using or selling these products for use in such applications do so at their own risk.

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**BLOCK DIAGRAM**

