

UC1681u

*Single-Chip, Ultra-Low Power
68COM x 294SEG Matrix
Passive Color LCD Controller-Driver*

INTRODUCTION

UC1681u is an advanced high-voltage mixed-signal CMOS IC, especially designed for the display needs of ultra-low power hand-held devices.

This chip employs UltraChip's unique DCC (Direct Capacitor Coupling) driver architecture to achieve near crosstalk free images, with well balanced gray shades and vivid colors.

In addition to low power COM and SEG drivers, UC1681u contains all necessary circuits for high- V_{LCD} power supply, bias voltage generation, 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 68x98 matrix C-STN LCD with comprehensive support for input format and color depth:
 - 8-bit RGB: 256-color
 - 12-bit RGB: 4K-color
 - 16-bit RGB: 58.6 K-color (dithered)
- Support video rate CSTN applications.
- Partial scroll function and programmable data update window to support flexible manipulation of screen data.
- One ID pin (software-readable identification bit) to support configurable vendor identification.
- Support both row ordered and column ordered display buffer RAM access.

- Support industry standard 2-wire, 3-wire, 3/4-wire, and 4-wire serial bus (I²C, S9, S8uc, S8), and 8-bit/4-bit parallel bus (8080 or 6800).
- Special driver structure and gray shade modulation scheme. Ultra-low power consumption under all display patterns.
- No power consumption or image quality penalty when used with video rate CSTN
- Fully programmable Mux Rate, partial display window, Bias Ratio and Line Rate allow many flexible power management options.
- Software programmable four temperature compensation coefficients.
- Self-configuring 7x charge pump with on-chip pumping capacitors
- Flexible data addressing/mapping schemes to support wide ranges of software models and LCD layout placements.
- Very low pin count 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: 1.8V (Typ.) ~ 3.3V
 V_{DD} (analog) range: 2.5V (Typ.) ~ 3.3V
LCD V_{OP} range: 4.8V ~ 11.8V
- MTP V_{LCD} trimming circuit to support precise LCD contrast matching
- Available in gold bump dies:
 - Bump pitch: 29 μ M
 - Bump gap: 13 μ M
 - Bump surface: 2000 μ M²

ULTRACHIP

High-Voltage Mixed-Signal IC

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ORDERING INFORMATION

GOLD BUMPED DIE

Part Number	MTP	I ² C	Description
UC1681uGAA	Yes	Yes	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.

USE OF I²C

The implementation of I²C is already included and tested in all silicon. However, unless I²C licensing obligation is executed satisfactorily, it is not legal to use UltraChip product for I²C applications. Unless I²C version is ordered from UltraChip, the customer will take the responsibility for all such licensing liabilities.

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 & ESD SENSITIVITY

The MTP memory cell is sensitive to photon excitation and ESD. Under extended exposure to strong ambient light, or when TST4 pin is exposed to ESD strikes, the MTP cells can lose its content before the specified memory retention time span. The system designer is advised to provide proper light & ESD 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.

CONTENT DISCLAIMER

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BLOCK DIAGRAM

