



Ultra low power OLED microdisplay

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Data glasses and wearables nowadays are not just trend but also open up a wide range of applications in various sectors. As fitness trackers they monitor heart rate, pulse and other vital parameters or remind users of necessary medications. In the industrial sector, data glasses support construction work, for example, by displaying additional information to users, so that they are not forced to remove their hands from work. In the sports industry, tiny displays can act as navigation systems by integrating them into the field of view, or into clothes. Joggers, for example, would no longer have to look at jiggling smartphone displays while running.

Battery-saving display for various applications

Typically, tiny microdisplays are used in data glasses to show moving video images. The problem: Regardless of the image content, large data volumes are transferred and processed by the system electronics and the microdisplay. This leads to a short battery runtime and noticeable heat generation. Moreover, all necessary electronics including the battery are limiting the miniaturization of the entire system design. Many applications place higher priority on a long battery runtime and a slim and lightweight design than the ability to play videos in HD.

According to these special requirements, Fraunhofer IPMS has developed a novel microdisplay concept with an extremely low power consumption and simplified electronics.



HMD prototype



Evaluation kit

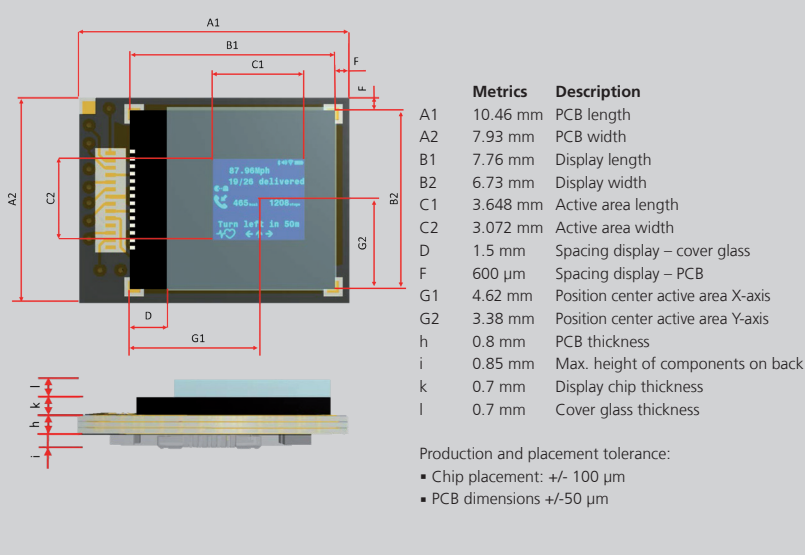
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Dimensions of COB UUGL1120

Application scenario

Concept

Fraunhofer IPMS has many years of experience in the development and production of OLED microdisplays. These are based on the monolithic integration of organic light-emitting diodes on silicon CMOS chips to control the individual pixels. In contrast to modulating display technologies (LCD, LCOS, ...), the self-emitting property of OLEDs means that only those pixels that need to emit light are controlled. This enables very energy-efficient displays and very high contrast ratios of > 10,000:1.

The basic idea for reducing power consumption is to minimise the necessary data transmission while simultaneously eliminating the otherwise necessary refresh cycles within the display. To achieve this, the display pixels are equipped with static memory and arranged in a freely addressable matrix so that only the image areas in which the content changes need to be refreshed. The energy savings achieved in this way are enormous: compared to microdisplays for video applications, the typ. power dissipation has been reduced from 200 mW to 2 – 3 mW.

A serial SPI or IIC interface is used for control. This enables a minimalist overall system with a simple microcontroller without additional video sources or processors..

Technical data (Other versions upon request)

- Bright display image thanks to OLED technology
- Monochrome green, > 1000 nits, other colors available on request
- Wide dimming range
- Data interface: SPI / IIC
- Max. 30 fps
(@refreshing of all pixels, significantly higher @ partial refreshing of image)
- Power consumption: ≈ 1 – 3 mW
- IO-voltage: 1.6 ... 5.5 V
- COB package 10.5 × 8 mm²

Display versions

UUGL1120

- 0.19" screen size
- 304 × 256 pixel, 12 µm pixel pitch
- 4 Bit grayscale
- Power supply: GND, Core 1.8 V, OLED cathode -5V

UUGL1220

- 0.16" screen size
- 304 × 128 pixel, 12 µm pixel pitch
- 4 Bit grayscale
- Power supply: GND, Core 1.8 V, OLED cathode -5V

UUGL1320

- 0.15" screen size
- 720 × 256 pixel, 5 µm pixel pitch
- 1 Bit grayscale
- Power supply: GND, Core 5 V, OLED cathode = GND

Our offer

The OLED microdisplays can be purchased for evaluation purposes. We offer different versions of evaluation kits. The main component is the display (UUGL 1120, 1220 or 1320), which is chip-on-board assembled on a small PCB with a flat connector on the back. The connector can be extended by 10 cm by an included flex cable.

Eval-Kit 1

- Display on PCB, flex cable
- Breakout board
- Microcontroller eval board
- Demo software

Eval-Kit 2

- Display on PCB, flex cable
- Miniaturized driving unit
- Optics, case
- Demo software

Fraunhofer IPMS is ready to provide customer-specific developments, prototyping and small series manufacturing. Large volumes can be supplied commercially by an established manufacturing partner.