

# Product Brief

## DA8223 real-time 2D to 3D video and still image conversion

### General Description

DA8223 is a single-chip 2D to 3D converter IC that converts 2D video and still images into vibrant 3D in real-time. DA8223 unlocks a world of 3D content providing consumers with an unbounded 3D experience

Compared with traditional software based solutions, DA8223 removes all loading from the host application processor providing an ultra low power 3D converter with no external memory requirement.

The chip includes a fully integrated parallax barrier driver which when connected to a parallax barrier display, removes the need for 3D glasses allowing the viewer to see 3D directly.

DA8223 is ideal for battery operated handheld devices such as 3D smartphones and tablet PCs.



Chip available in UFBGA 5x5mm package

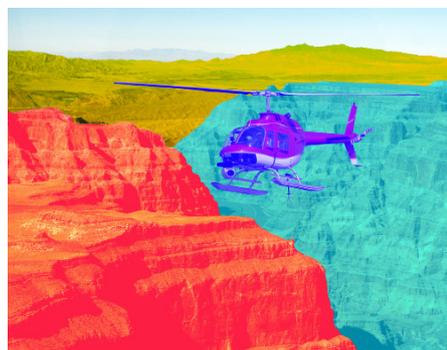
#### Converting 2D images to 3D

The DA8223 operates in real-time on the RGB image data typically provided by the host application processor. The conversion to 3D is a three stage process:

1. Each 2D image (picture still or video frame) is converted into a depth map separating picture elements into foreground and background.



Original still image or video frame



Depth map

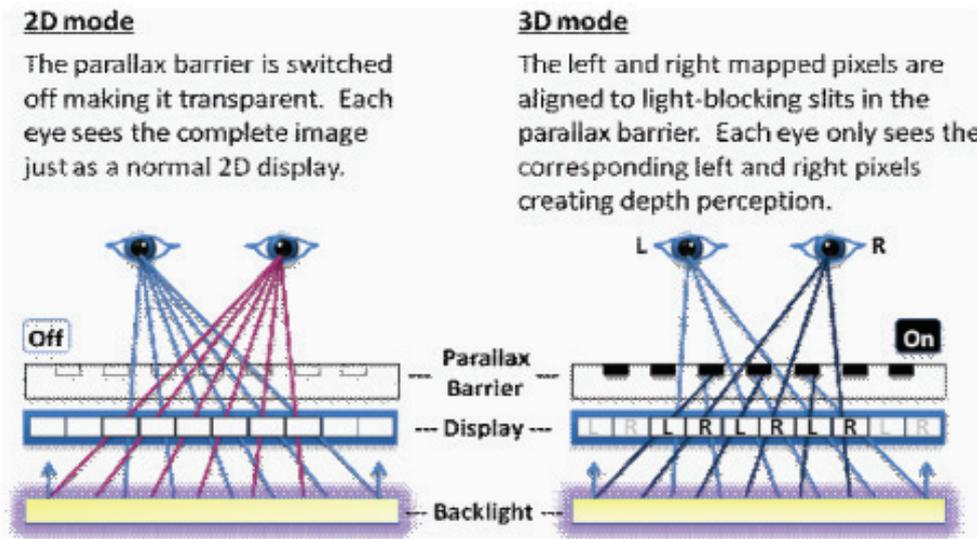
2. Each pixel from the original 2D image is assigned a depth tag identifying if it is located in the foreground or background. The perceived degree of separation (shift) between foreground and background is realised by shifting the foreground pixels. The greater the shift, the deeper the 3D effect will appear to the viewer.

3. The shifted pixel image is then processed by the image formatter. This aligns and synchronises each left and right eye pixel to the 3D display's parallax barrier filter with the resulting image appearing in 3D without the need for 3D glasses.

The whole conversion process has a latency time of less than one frame resulting in near-instantaneous 3D conversion. This super fast conversion enables instant switching between portrait and landscape modes allowing the viewer to rotate the display at will.

## Dual Parallax barrier driver

DA8223 is designed to integrate seamlessly with the latest 3D displays utilising parallax barrier technology. The parallax filter layer when applied to standard handheld displays creates small slits which ensure light from each left and right pixel is only seen by the corresponding left and right eye of the viewer.

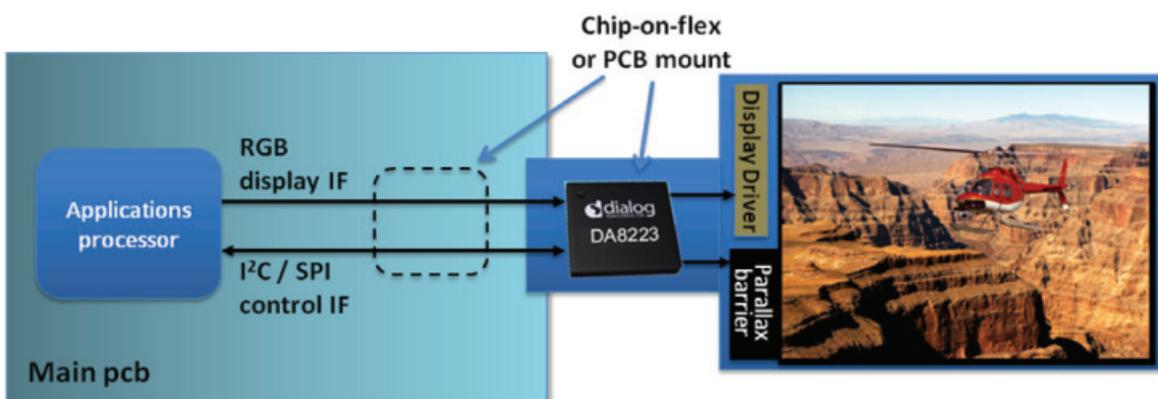


Parallax barrier

The DA8223 auto senses the start of each video frame and synchronise control of the parallax barrier filter ensuring it is in-step with the video. The parallax barrier can be switched on and off enabling the display of both 2D and 3D content. The DA8223's dual driver can control 2 parallax barriers enabling 3D viewing in both portrait and landscape modes.

## Application

DA8223 fits between the host application processor's display interface and the display driver IC in a typical Smartphone or tablet PC application.



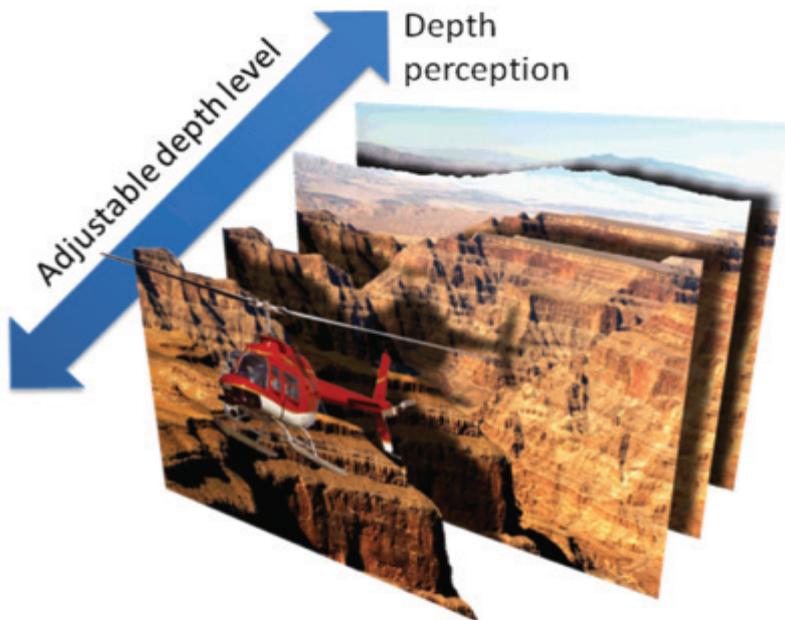
DA8223 Application diagram

The small chip package is designed to mount either on the PCB alongside the host processor or as a chip-on-flex as part of the display module. This provides product designers with complete flexibility and opens up the possibility of retro fitting DA8223 into existing 3D designs.

Three operating modes allow the display of original 2D and 3D content as well as the conversion of 2D content to 3D.

1. Native 3D mode. DA8223 passes 3D content direct from the host processor and synchronises control of the parallax barrier for 3D display.
2. 2D mode. DA8223 is in full bypass mode passing 2D content from the host processor to the display with the parallax barrier switched off.
3. 2D to 3D mode. DA8223 converts incoming RGB data to 3D and outputs to the display while synchronising control of the parallax barrier.

DA8223 is configured and controlled using an internal register set accessed via standard I2C interface or SPI. The one-time-set display and parallax barrier configuration is fully programmable and can accommodate a wide range of display technologies, screen resolutions and sizes. Once set, the configuration can be hard coded using the one-time-programmable (OTP) memory.

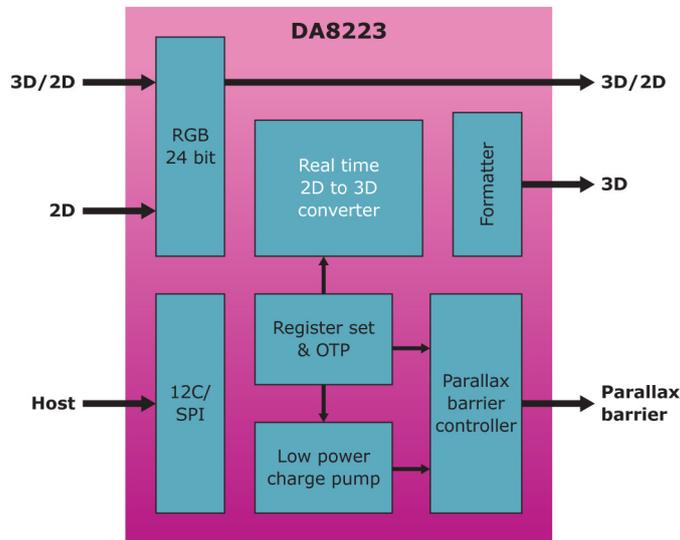


Adjustable Depth perception

DA8223 provides a comfortable 3D viewing experience allowing users to watch complete movies without feeling too tired.

Because people perceive 3D effect in different ways, the chip allows the user to adjust 3D depth levels and control if the 3D effect appears to come out of or into the screen. These settings can be adjusted on-the-fly and have an immediate effect on the screen image.

## Block Diagram



### Features

- Real-time 2D to 3D video and still image conversion with no host processor loading, no external memory and no delays
- Native portrait and landscape display support with full screen rotation
- Three operating modes enabling the display of original 3D content, 2D content and 2D to 3D converted content
- User adjustable 3D viewing modes with the 3D effect protruding from or intruding into the display
- User adjustable 3D depth levels
- Standard I2C and SPI control interface
- Dual fully programmable parallax barrier drivers supporting portrait and landscape parallax displays
- Ultra-thin chip package compatible with PCB mount or chip-on-flex mounting on display module

### Applications

- Smart phones
- PC Tablets
- Personal multimedia Players

### Package

- UFBGA 5x5mm

## Dialog Semiconductor worldwide offices

**Germany - Headquarters**  
Phone: +49 7021 805-0

**The Netherlands**  
Phone: +31 73 640 88 22

**Korea**  
Phone: +82 2 569 2301

**Japan**  
Phone: +81 3 3769 8123  
Phone: +81 3 5408 4330

**China**  
Phone: +852 2607 4271

**United Kingdom**  
Phone: +44 1793 757700

**North America**  
Phone: +1 408 727 3200

**Singapore**  
Phone: +65 64845419

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