Technical Brief

MIGRATING FROM THE CS7665 TO THE CS7666

OVERVIEW

The CS7666 forms the heart of a four chip digital CCD camera. The four chips include the CCD imager, a vertical drive interface chip for the CCD, the CS7615 CCD analog processor, and the CS7666 color space processor. Most four-phase CCD imagers (with their associated vertical drivers) can be used with an appropriate analog front end, such as the CS7615, and the CS7666 to form a simple and cost-effective digital camera. The CS7666, when used with the CS7615, supports imager formats from 175x175 pixels to over 1000x1000 pixels. The CS7666 provides all clocks necessary to drive the CS7615 and synchronizes itself to the CS7615 data stream by decoding the timing cues embedded in the CS7615 data stream. Alternately, the CS7666 accepts horizontal and vertical timing on pin inputs. The CS7666 acts as a limited bus master to program I^2C slave devices using configuration data stored in an inexpensive external EEPROM. The CS7666 will read an optional I^2C I/O port expander, such as the Philips PCF8574 or the CS4954, and select one of up to 8 configurations.

CS7666 NEW FEATURES

The CS7666 is a direct replacement for the CS7665. No board or software changes are needed for existing designs. However, slight changes to existing hardware and software are necessary to take advantage of the CS7666's enhancements

Color Kill

As a CCD nears saturation, the color information will become invalid. In the most general case, a white light will start to appear cyan. This effect is due to the four-color filter process and how the color processor removes the extra green from the CCD signal (adding the CYMG filter values generates 2R+3G+2B not R+G+B). To overcome this problem, the CS7666 compares every pixel to a set of programmable thresholds to determine if the pixel is close to saturation. If the pixel violates the thresholds, the color of the pixel is forced to white. This circuit may be turned off .

Auto-Boot Feature

For stand-alone operation the CS7666 can operate as a limited bus master for I^2C like busses. When

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Feature	CS7665	CS7666
scaler	4:5	1:2,2:3,4:5,9:13,11:16,11:20,variable
Autoboot	1 configuration file	up to 8 selectable configurations
Saturation control	electronic shutter	electronic shutter, "color kill"

Table 1. Enhancements

For further information, please contact Cirrus Logic's Crystal® Product Support at (512) 445-7222 or 1 (800) 888-5016

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the CS7666 is taken out of reset, it will load configuration data stored in an external serial EEPROM into any IC connected to the CS7666 through one of its two I^2C compatible serial control ports. Unlike the CS7665, the CS7666 has the ability to select one of several configurations stored in the EEPROM. After reset, the CS7666 will read the state of an external I/O port (such as the CS4954 GPIO port or the Philips SAA8574) and determine which 1 of 8 possible configuration settings will be used. The CS7666 adds new instructions to allow multiple configurations to share common data, such as gamma tables, to reduce the total amount of required EEPROM space. Like the CS7665, the CS7666 can address up to 16K bits of external EEPROM. Also, the CS7666 will use existing CS7665 EEPROM files without modification.

Image Scaling

The CS7666 provides enhanced scaling features not found in the CS7665. The CS7666 contains a programmable PLL and linear interpolation filter. The CS7666 was designed to produce square-pixel and rectangular-pixel formats for common video encoders while using inexpensive 512 pixel per line or 362 pixel per line imagers. Eight common scaling modes are easily selectable from one register, but the user may also program the PLL/Scaler with a general M/N value(M,N < 32). The PLL may be bypassed, if desired, to provide non-scaled video output.

Scaler Mode	CCD Format	Output Format	Scaling Ratio
000	up to 1Kx1K	same as source	1:1
001	512x480	640x480	5:4
010	512x480	720x480	13:9
011	512x576	720x576	16:11
100	362x480	640x480	20:11
101	362x480(576)	640x480,720x480(576)	2:1
110	512x576	720x480(576)	24:17
111	512x576	720x576	3:2