

## PRODUCT ALERT

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# RGB561 220 MHz and 250 MHz, Blanking Skew

### Summary

The RGB561 has an internal timing problem that can cause incorrect display of pixels at the start and end of scan lines. The problem occurs at high clock speeds. The 220 MHz and 250 MHz parts are affected, but there is no problem with the 170 MHz part.

A work-around is available and is described below.

### Part Numbers Affected

- ❑ 37RGB561 CF 22
- ❑ 37RGB561 CF 25

### Description of the Problem

The RGB561 uses the LOAD\_CLK input to sample pixel data on the PIX<sub>199-0</sub> inputs and blank/display timing on the  $\overline{\text{CBLANKIN}}$  input. Pixels and blank timing are carried together internally in a pipeline fashion up to the DACs (Digital to Analog Converters). If the internal  $\overline{\text{CBLANKIN}}$  signal is high the pixels will be displayed; if low the DACs will be forced to the blanking level.

At high speeds the internal synchronization of the pixel data and the blank timing can become offset by one pixel clock, such that  $\overline{\text{CBLANKIN}}$  is “skewed to the right” by one pixel time relative to the pixel data. This causes two visible effects:

1. The first (left-most) pixel of each scan line is discarded.
2. An extra (right-most) pixel is displayed at the end of each scan line.

Each LOAD\_CLK clocks in a number of pixels which are multiplexed down at pixel clock speeds. The extra pixel that is displayed at the end of the scan line is left over from the previous LOAD\_CLK. If, for example, 4:1 multiplexing is used, whatever pixel is normally fourth from the end of the scan line is the pixel that will be incorrectly duplicated at the end of the scan line.

See Figures 1a and 1b for illustrations of normal pixel display and pixel display with the timing problem.

### Work-Around

The following steps can be used to eliminate the effects of the timing problem:

1. Start each line with one or more black pixels.
2. Adjust the timing of  $\overline{\text{CBLANKIN}}$  such that the black pixel is normally displayed. If the timing problem exists the black pixel will be discarded. If the timing problem does not exist the pixel will be displayed but will not be visible because it is black.
3. End each line with a string of black pixels. The number of black pixels to use is the number of pixels loaded with each LOAD\_CLK. E.g., in 4:1 mode use four black pixels.
4. Adjust the timing of  $\overline{\text{CBLANKIN}}$  such that the black pixels are normally displayed. If the timing problem

does not exist the black pixels will be displayed but will not be visible because they are black. If the timing problem exists an additional black pixel will be displayed.

See Figures 1c and 1d for illustrations of the work-around applied, for normal pixel display and pixel display with the timing problem.

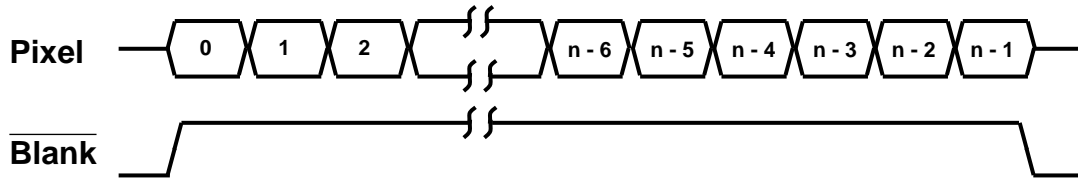


Fig 1a. Normal frame buffer, normal timing.

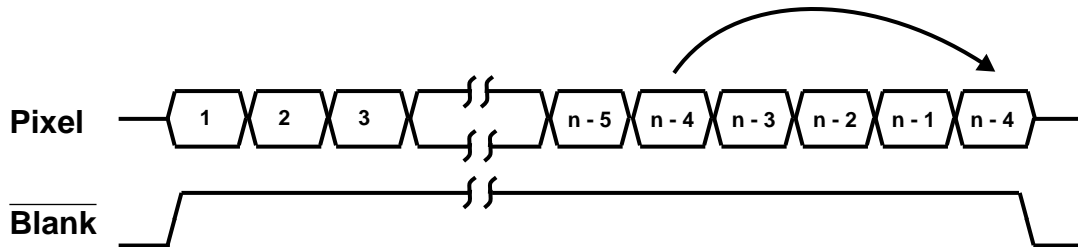


Fig 1b. Normal frame buffer, with timing problem. The left-most pixel is discarded and an extra pixel displays at the right.

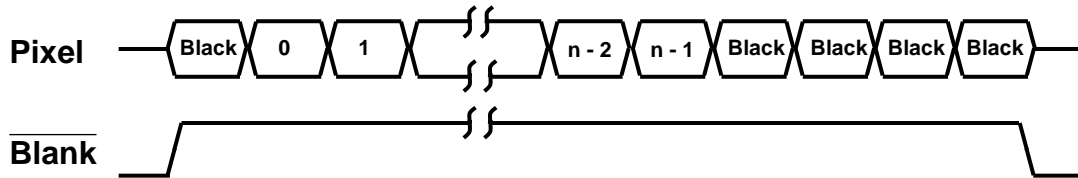


Fig 1c. Frame buffer with black pixels for work-around, normal timing.

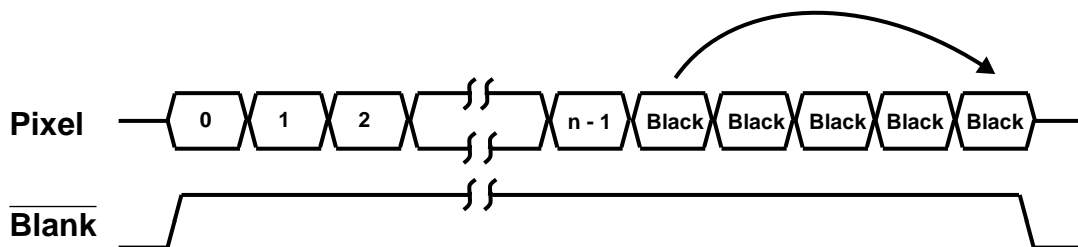


Fig 1d. Frame buffer with black pixels, with bad timing. The left-most black pixel is discarded; an extra black pixel displays at the right.

Figures 1a - 1d show internal timings for the RGB561 for a scan line of  $n$  pixels, labeled 0 through  $n - 1$ . For these examples a multiplex mode of 4:1 is used.



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IBM Microelectronics Division  
1580 Route 52, Bldg. 504  
Hopewell Junction, NY  
12533-6531

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