

# Dimming ICEBrite VGA Displays

EL640.480-AM1/AG1/AF1

Application Note 120-00

Planar's ICEBrite™ displays have exceptional contrast and brightness combined with relatively low power consumption. This is achieved through a *split screen* architecture where the display is divided into an upper and a lower half. Both halves are scanned simultaneously, resulting in twice the maximum frame rate compared with the conventional architecture. In addition, power consumption is reduced by using some special characteristics of EL display technology.

Most displays are refreshed at 60 Hz. The ICEBrite displays can also be refreshed at 120 Hz. Brightness is proportional to refresh rate, resulting in double the brightness when refreshed at 120 Hz. This additional brightness is advantageous in bright light conditions, however there are times when you may want to dim the display for specific applications, or in low ambient environments.

There is no analog dimming on the standard display. Dimming is performed as part of the application by lowering the scan rate of the video input signals. There are two reliable methods to modify the scan rate:

- ◆ Adding pauses between every horizontal period
- ◆ Lowering the video clock frequency (use the utilities or clock commands included from the chip manufacturer)



*Adding pauses between every vertical period is not a recommended method. With a display response time of less than one millisecond, even short pauses at the end of a vertical period are noticeable as flicker in split screen displays.*

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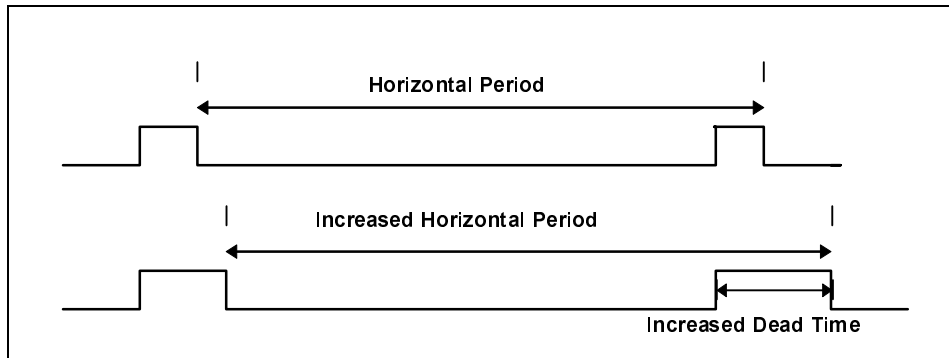
## Adding Pauses to the Horizontal Period

Figure 1 illustrates adding pauses to the horizontal period by increasing the total time it takes to display a row. Adding refresh (or dead time) beyond the number of displayed characters does not affect the displayed image.



*Do not adjust the horizontal period to be less than the minimum scan rate specified for the display. The display will not function properly.*

The lowest possible frame rate (brightness) is dependent on the perceived flicker of the displayed image, but will be most likely around 60Hz, resulting in the dimming the display to half the maximum brightness. Frame rates less than 60 Hz potentially can flicker.



**Figure 1. Adjusting the Horizontal Period.**

*A 34.5  $\mu$ S horizontal period equates to a 120 Hz frame rate. Increasing the dead time by 10  $\mu$ S to a 44.5  $\mu$ S horizontal period results in a calculated frame rate of 93 Hz. This is 78% of the brightness at 120 Hz.*

## Additional Information

Planar Applications Engineering provides support to assist with ICEBrite display design related issues. Contact a Planar office, or visit the Planar web site. Register and BIOS files are available for some of the newer video controllers.

Contact Chips and Technologies to purchase the initialization routines used to write or load BIOS files as well as the utilities to load and save register settings. Chips and Technologies: (408) 434-0600 or FAX (408) 434-6452.

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