

# Driving Flat Panel Displays With SiliconBlue's Custom Mobile Device

## Mobile Display Evolution

Video displays have been evolving in mobile applications. In order to support functions such as social networking, navigation, and web surfing, smart phone designers are adding larger and higher resolution displays. In addition, video and images are not just viewed on the local handset display, but now starting to drive external displays for content sharing. In order to support multiple video sources and display outputs, one of the challenges mobile application designers face is to successfully route all those video streams around a small-form-factor handheld device.

## Differential Signaling

Many of today's mobile applications are moving to serial, differential interfaces, based around the Low-Voltage Differential Swing (LVDS) I/O standard. Using serial, differential signals versus conventional parallel signals have multiple benefits. Differential outputs:

- reduce the number of signals required to route video signals
- enable faster switching speeds and potentially higher bandwidth due to a reduced voltage swing
- consume less power and produce less electromagnetic interference (EMI) due to a reduced voltage swing
- have better noise immunity

Figure 1 shows a differential output pair of a SiliconBlue Custom Mobile Device™. Logical "1" and logical "0" values are derived based on the difference between the two sides of the signal output pair. Since noise affects both traces similarly, the difference of the signals remains relatively constant.

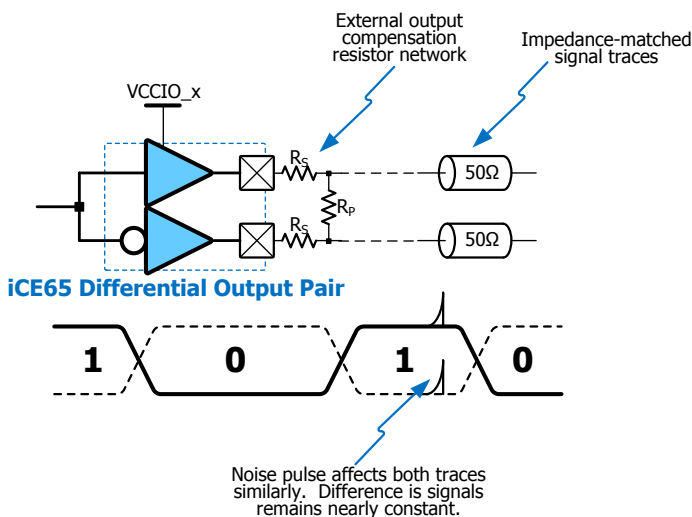


Figure 1 - Differential Output of SiliconBlue Custom Mobile Device

## Using a Custom Mobile Device as a Display Controller

Figure 2 illustrates how a Custom Mobile Device from SiliconBlue can be used to drive a flat panel display using low-voltage differential swing channels. SiliconBlue's Custom Mobile Device can be customized to drive different sized displays, with different color depths, and with different interfaces including LVDS, sub-LVDS, RSDS, and LVPECL. See SiliconBlue's Application Note 014: *Using an iCE65 mobileFPGA as a LVDS, FPD-Link Display Driver* for more details.

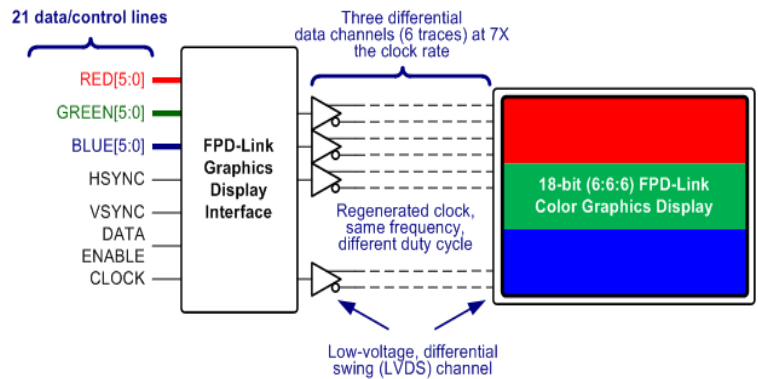


Figure 2 - A Custom Mobile Device as a Display Driver

Figure 3 shows the data encoding for the 21 signals in an 18-bit (6:6:6) RGB interface onto three LVDS output data pairs. Figure 4 shows data encoding for 27 or 28 signals in a 24-bit (8:8:8) RGB interface onto four LVDS output data pairs.

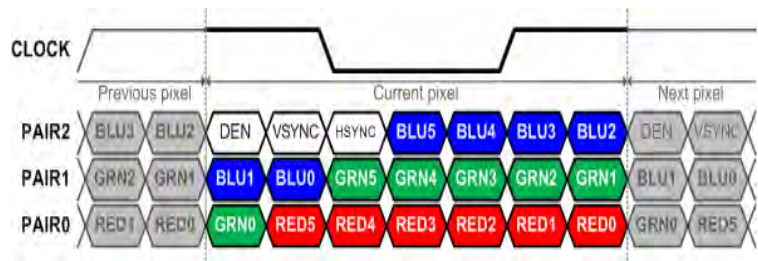


Figure 3 - 18-bit color (6:6:6) FPD-Link Data Encoding

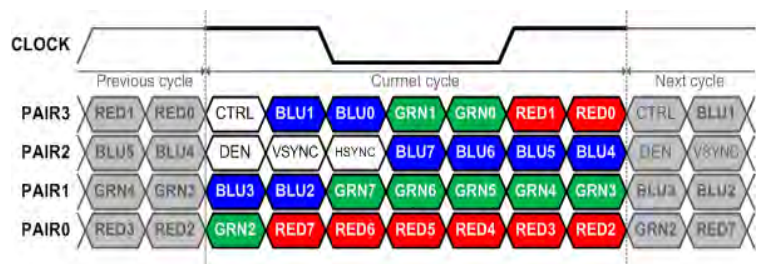


Figure 4 - 24-bit color (8:8:8) FPD-Link Data Encoding

# Driving Flat Panel Displays With SiliconBlue's Custom Mobile Device

## SiliconBlue's Custom Mobile Devices Support 350 Mbps Video Bandwidth

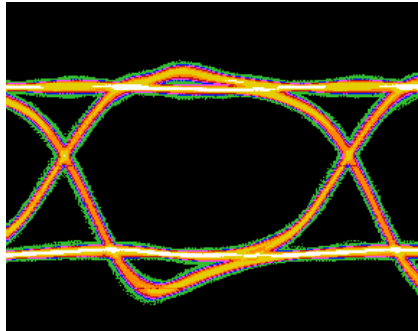


Figure 5 - Eye Diagram of LVDS running at 350 MHz

SiliconBlue's Custom Mobile Devices™ can support up to 350 Mbps supporting up to 720p HD video receive and transmission. The iCE65™ P-Series mobileFPGA™ devices are ideally suited for mobile video application and include plentiful logic capacity, phase-locked loops, and embedded RAM while consuming minimal power.

### Additional Resources

For additional information on how SiliconBlue's Custom Mobile Devices can be used in flat panel display applications, the following resources are available:

#### Application Notes

- AN008: *Using Differential I/O in iCE65 mobileFPGA Devices*
- AN014: *iCE65 mobileFPGA as a LVDS, FPD-Link Display Driver*

#### Tools

iCE65 Differential Output Calculator

#### Demo and Reference Design Example

iCE65 P-Series Device Driving WSVGA Display (1024x600) with LVDS operating at 350 Mbps (See Figure 6).

Please contact your local sales representative for more information and to schedule a demonstration.



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### P-Series

Optimized for display, memory and SERDES applications (1.2 Volt Operation)

PART NUMBER	P04	P08 <sup>1</sup>	P12 <sup>1</sup>
Logic Cells	3,520	7,680	12,160
System Gate Equivalent	200K	400K	600K
Embedded RAM Bits	80K	128K	160K
Embedded RAM 4K Blocks	20	32	40
Phase-Locked Loop	1	2	2
Power/Speed Grade (-T @ 1.2V)	-T	-T	-T
Core Operating Current, 0 KHz	43 µA	TBD	TBD
Core Operating Current, 32 KHz	60 µA	TBD	TBD
Core Operating Current, 32 MHz	9 mA	TBD	TBD
Configuration Bits	533K	TBD	TBD
PACKAGE	PROGRAMMABLE I/O: MAX I/O (LVDS CHAN- NELS)		
121-pin BGA (6x6 mm)		95 (13)	
196-ball BGA (8x8 mm)	148 (18)		
284-ball BGA (12x12 mm)	174 (20)		
DiePlus™			

Notes: 1. Consult Factory

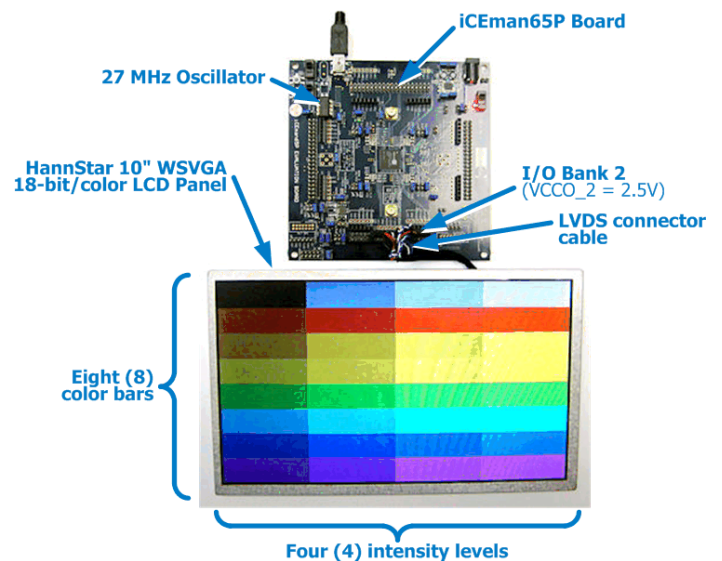


Figure 6 - iCE65 P-Series mobileFPGA Driving WSVGA Display

For additional information visit us at [www.siliconbluetech.com](http://www.siliconbluetech.com)