

Capabilities of XS1-G4 in LED Control Applications

(VERSION 1.0)



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PWM Enabled Driver ICs

This section details the capabilities of the XS1-G4 when driving PWM-enabled LED Drivers, such as Macroblock MBI5030 and similar.

XS1-G4 144 BGA Package

Scan Rate	PWM Resolution (bits per LED)	Pixels per XS1-G4	Screen Refresh Rate (Hz)
Static	6bit	16000	60
Static	10bit	16000	60
Static	12bit	16000	60
Static	16bit	16000	60
1/8	6bit	4096	750
1/8	10bit	4096	750
1/8	12bit	-Unsupported by LED Driver IC-	
1/8	16bit	-Unsupported by LED Driver IC-	

XS1-G4 512 BGA Package

The 512BGA package only gives improvements over the 144BGA package in the 1/8 scan mode, where refresh rates must be higher.

Scan Rate	PWM Resolution (bits per LED)	Pixels per XS1-G4	Screen Refresh Rate (Hz)
Static	6bit	16000	60
Static	10bit	16000	60
Static	12bit	16000	60
Static	16bit	16000	60
1/8	6bit	12288	750
1/8	10bit	12288	750
1/8	12bit	-Unsupported by LED Driver IC-	
1/8	16bit	-Unsupported by LED Driver IC-	

Non-PWM Enabled Driver ICs

This section details the capabilities of the XS1-G4 when driving non-PWM-enabled LED Drivers, such as MBI5026 and similar.

XS1-G4 144 BGA Package

PWM Resolution (bits per LED)	Pixels per XS1-G4	Refresh Rate Capability (Hz)
8bit	2048	230
10bit	1024	152
12bit	256	152

XS1-G4 512 BGA Package

The 512pin package enables another XCore to be directly used for LED driving, as well as utilizing a wider bus for 12bit mode.

PWM Resolution (bits per LED)	Pixels per XS1-G4	Refresh Rate Capability (Hz)
8bit	4096	230
10bit	2048	152
12bit	1024	152

Prototyping

The XS1-G4 can be fully evaluated for LED Control Applications using the XC-3 LED Tile Control Kit. An LED Module can also be supplied. The XC-3 features a 144BGA package and two 10/100Mbps Ethernet ports and is available from www.xmos.com.

For driving PWM-enabled LED Drivers, the XC-3 supports the following:

Scan Rate	PWM Resolution (bits per LED)	Pixels per XS1-G4	Screen Refresh Rate (Hz)
Static	6bit	16000	60
Static	10bit	16000	60
Static	12bit	16000	60
Static	16bit	16000	60
1/8	6bit	2048	750
1/8	10bit	2048	750
1/8	12bit	-Unsupported by LED Driver IC-	
1/8	16bit	-Unsupported by LED Driver IC-	

For driving Non-PWM-enabled LED Drivers, the XC-3 supports the following:

PWM Resolution (bits per LED)	Pixels per XC-3	Refresh Rate Capability (Hz)
8bit	512	230
10bit	256	152
12bit	128	152

BOM Comparison

Outdoor Displays

For a static (i.e. non-scanning) LED Driver arrangement typical on outdoor displays, large cost savings can be realized by using the XS1-G4 to drive non-pwm-enabled LED Drivers. An example BOM Comparison follows:

	PWM Drivers	Non-PWM Drivers 10bit mode	Non-PWM Drivers 12bit mode
Display Size:	1024 x 768	1024 x 768	1024 x 768
Number of Scan Boards:	50	384	768
Number of LED Drivers:	147456	147456	147456
Cost of Scan Boards:	\$1500	\$11520	\$23040
Cost of LED Drivers:	\$147456	\$73728	\$73728
Total Cost:	\$148956	\$85248	\$96768

Indoor Displays

For a 1/8 scan LED Driver arrangement typical on indoor displays, moderate cost savings can be realized by using the XS1-G4 to drive non-pwm-enabled LED Drivers. An example BOM Comparison follows:

	PWM Drivers	Non-PWM Drivers 8bit mode
Display Size:	1024 x 768	1024 x 768
Number of Scan Boards:	64	192
Number of LED Drivers:	147456	147456
Cost of Scan Boards:	\$1920	\$5760
Cost of LED Drivers:	\$18432	\$9216
Total Cost:	\$20352	\$14976

Assumptions

NOTE: Throughout the document, the following are assumed. Note that these costs and figures may differ for various applications.

- 3 LEDs (R,G,B) are required per pixel
- Drivers SPI Clock Rate: 25Mhz
- Scan Board cost: \$30
- MBI5030 cost: \$1.00
- MBI5026 cost: \$0.50

Related Documents

The following documents provide more information on designing with the XC-3:

- LED Reference Design Application Note
 - Provides overview of the LED Video wall architecture and implementation details of the Reference Design.
 - <http://www.xmos.com/xc3>
- *XC-3 Hardware Manual*
 - Provides detailed information on the XC-3 hardware components and port mapping.
 - <http://www.xmos.com/published/xc3hw>

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