



AHB-Lite Display Block

Overview

This is a display interface for the 7-segment display on the Nexys-4 board, designed to be a slave on an AHB-Lite bus. It allows direct access to all 64 segments of the display (raw mode). It can also be configured to display a 32-bit value in hexadecimal, with independent control of the dots or point markers (hexadecimal mode). The mode can be set independently for each digit, and each digit can also be enabled or disabled (blanked).

Programmer's Model

The display block presents four 32-bit registers to the processor, as shown in the table below. Only 32-bit word transactions are supported. Where the register has less than 32 bits, the relevant bits are the least-significant bits in the word. Unused bits will read as 0. All registers contain 0 after reset.

Register	Relative Address	Access	Description
rawLow	0x0	R/W	32 bits with patterns to display on four rightmost digits when raw mode is selected. Bits 7 to 0 control rightmost digit (digit 0), bits 15 to 8 control digit 1, etc. Bits 7 to 1 control segments A to G respectively, bit 0 controls the dot. 1 = on.
rawHigh	0x4	R/W	32 bits with patterns to display on four leftmost digits when raw mode is selected. Bits 7 to 0 control digit 4, bits 15 to 8 control digit 5, etc., otherwise as above.
hexData	0x8	R/W	32-bit value to be displayed in hexadecimal on the 8 digits when hexadecimal mode is selected. The value of bits 3 to 0 is displayed on the rightmost digit (digit 0), etc.
control	0xC	R/W	24 bits to configure the display block – see details below.

Control Register

The control register can be viewed as 3 separate 8-bit groups:

Bits	Description
23:16	Enable individual digits. Bit 23 for digit 7 (left), bit 16 for digit 0 (right). 1 = enabled, 0 = blank.
15:8	Set mode for individual digits. Bit 15 for digit 7, bit 8 for digit 0. 1 = hexadecimal mode: show digit representing the corresponding 4 bits in hexData. 0 = raw mode: show pattern from corresponding 8 bits in rawLow or rawHigh.
7:0	Control the dot for individual digits when in hexadecimal mode. Bit 7 for digit 7, bit 0 for digit 0. 1 = on.