



## 2.3 64-Bit Operations

### 2.3.1 VMEbus Specification

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The primary reason for the development of the VIC64 was to provide users with the capability to perform 64-bit-wide data transfers in a manner consistent with the goals of the 64-bit VMEbus specification, more commonly known as the VME64 specification. The protocol for 64-bit MBLT (Multiplexed Block Transfer) is specified in an ANSI document VITA1–1994. The VIC64 implements this protocol.

### 2.3.2 Address Modifier Codes

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VIC64 responds as a slave to the address modifier (AM) codes associated with MBLT transfers as follows:

**\$3C, \$38, \$0C, \$08;** Performs D64 operation as implied by the actual AM code, and the contents of the Slave configuration Registers \$C3 and \$CB, and Block Transfer Definition Register \$AB.

**\$00–\$07;** No response: these codes are associated with 64-bit address operations, and the VIC64 does not support 64-bit address operation.

As a master, VIC64 will use the MBLT protocol to transfer data if the appropriate conditions occur:

AM codes \$3C, \$38, \$0C, \$08 are selected, and the appropriate bits of the configuration registers are set (see later for exact details).

In summary, VIC64 performs A32/D64 and A24/D64 operations in addition to the D8/16/32 single cycles and A16/24/32..D16/32 block transfers performed by VIC068A.

### 2.3.3 Boundary Crossing

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There are several implications of the 64-bit VMEbus protocol and the requirement for compatibility that you should consider. The VIC64, being a 144-pin device, can connect to only the lower byte of the VMEbus address. For block transfers other than D64 transfers, the VMEbus specification requires that the VMEbus address be rebroadcast at 256-byte boundary crossings; this quantity maps neatly into the byte of address that the VIC64 can monitor. MBLT transfers, however, are required to rebroadcast the address only at 2-Kbyte boundaries. VIC64 has no means of determining how the starting address of a master block transfer relates to the 2K boundary (it has access to only the lower 8 address bits), and therefore VIC64 rebroadcasts the address at every 256-byte boundary. This is still compatible with the specification, but has a small impact on the sustained transfer rate. If you wish to take advantage of the increased performance of 2-Kbyte boundaries, then VIC64 can be programmed to rebroadcast the address every 2048 bytes, and the starting address must then be aligned on a 2-Kbyte boundary.

### 2.3.4 External Circuit Complexity

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The VIC64 is a flexible building block that can be used in many different configurations. The VMEbus specification is written to allow many levels of circuit complexity to conform to the specification. Such circuitry may include slave address decode circuitry, local DMA transfer, slave read modify cycles, and more. The VIC64 and the VIC068A provide dual-path operation, a mechanism whereby the local bus master can perform single-cycle VMEbus operations during the time that the VMEbus is between block transfer bursts (interleave period). They also provide a mechanism allowing master write-posting, and slave read modify cycles to occur concurrently without harming the posted data. All this circuitry must be duplicated externally for the higher-order data bytes if you want these features.

You may choose to implement only those features that your system requires, thereby simplifying the necessary external circuitry. Alternatively, the user may decide to use the companion device, the CY7C964, and gain access to all the features using only three small devices. The CY7C964 is described in Section 4, The CY7C964 Bus Interface Logic Circuit.