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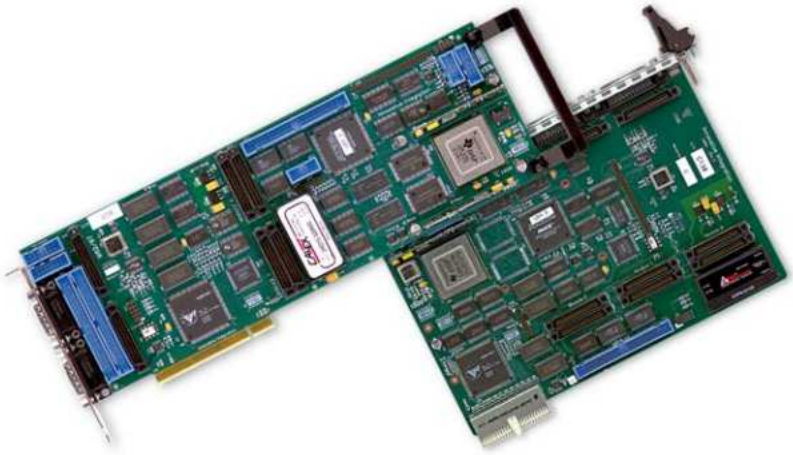
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Find the *Molex / Innovative Integration cM6x* at our website: ***Click HERE***

# M6x/cM6x

**OMNIBUS I/O Sites**
**1600 MIPS fixed-point**
**1 GFLOPS floating-point**
**TMS320C6x01 DSP**



## Features

- 200 MHz TMS320C6201 DSP (fixed-point) or
- 160 MHz TMS320C6701 DSP (floating-point)
- Two/Three OMNIBUS I/O Module Sites
- Multiboard Synchronization (ClkLink, SyncLink)
- PCI or CompactPCI Interface

## Applications

- Audio/Video processing
- Adaptive control
- Multi-axis motion control
- Multichannel audio
- RADAR/SONAR

## Hardware Options

| | |
|---|---|
| 256 KW SBSRAM | |
| 50 Pin IDC Breakout | pg 131 |

**OMNIBUS Compatible**

see page 73 for a complete list of OMNIBUS modules.

## Software Development Tools

| | |
|---|---|
| Zuma Toolset | pg 94 |
| TI Code Composer Studio | pg 91 |
| Code Hammer / Debugger | pg 102 |

## Ordering Information 'c' denotes CompactPCI

| | |
|---|---|
| M62 | 80012-0 |
| M62 DevPack | 90012-0 |
| cM62 | 80015-0 |
| cM62 DevPack | 90015-0 |
| M67 | 80030-0 |
| M67 DevPack | 90030-0 |
| cM67 | 80033-0 |
| cM67 DevPack | 90033-0 |

**DevPack Available**

See page 91 for details

## Overview

The M6x offers high performance and extreme flexibility with Texas Instruments' innovative TMS320C6x01 DSP and it's wide range of I/O peripherals. It's PCI plug-n-play interface, two (3 for CompactPCI) OMNIBUS I/O module sites, 32 bits of digital I/O and high-speed FIFOPort make it an excellent choice for the most demanding applications.

## Processor Core

The DSP's on-chip peripherals include two 32-bit counter/timers, four DMA channels, 1 Mbit SRAM, an HPI parallel port interface and a prioritized interrupt controller. Memory on the M6x includes a 512 KByte asynchronous SRAM region (ASRAM) for bus mastering transfers and 16 MBytes of 1 wait-state synchronous DRAM (SDRAM). Program memory may be expanded to include 1 MByte of 1 wait-state synchronous burst RAM (SBRAM).

## Onboard Peripherals

A simple, high-speed, memory-mapped, 32-bit latch is available to support general-purpose digital I/O. Direction is software-configurable in banks of eight bits and the port may be software or externally clocked at rates to 10 MHz. The output of an AD9851 digital synthesizer is routed to both OMNIBUS sites, providing a time base spanning 0-25 MHz programmable in increments of .02 Hz. Three 16-bit timers provide timebases for analog I/O, servo control and event counting. These timers, which may be internally or externally clocked, utilize a 10 MHz onboard crystal by default.

## Expansion

Two OMNIBUS sites provide a flexible I/O expansion mechanism. Available modules include multichannel analog I/O at a variety of rates and resolutions, digital I/O, RS232/422 serial communication. Since OMNIBUS is an elegant, open-architecture bus, custom modules may be designed easily and cost effectively to address unique application requirements.

The M6x's FIFOPort offers high-speed dedicated parallel board-to-board communications between multiple M6x cards and other FIFOPort compatible cards at rates up to 57 MBytes/sec read and 80 MBytes/sec write.

The M6x provides other features that make system-level integration fast and easy, such as SyncLink/ClkLink for multiple card synchronization and Plug-n-Play PCI. The SyncLink/ClkLink interface allows up to four unique timing signals and event triggers to be shared between up to 16 cards. Each M6x card has a switch matrix that routes any event trigger to any SyncLink/ClkLink port, completely under software control. There is no complex cabling, just a simple connection and software configuration.

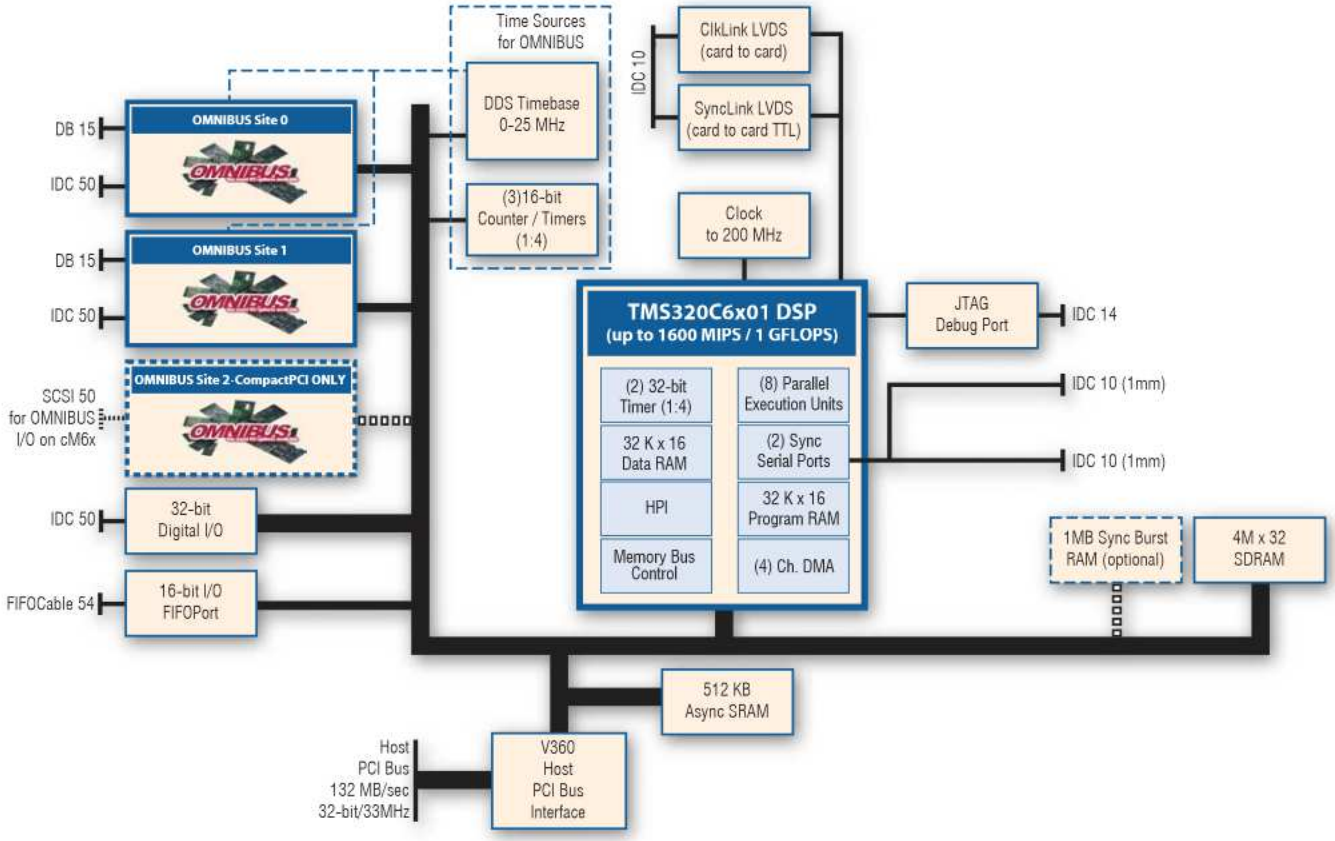
## Host PC Interface

The M6x is a standard 32-bit, full-size PCI card. ASRAM, which may be used for data storage, is the memory portal for PCI bus mastering transfers to and from the host PC. Data may be bus-mastered bidirectionally under the control of the 'C6x processor to the host PC's driver memory pool at burst rates to 132 MBytes/sec. During bus master transfers, the M6x is free to perform data collection and analysis functions. The ASRAM is also addressable from the host PC. Thus, applications may freely bus master or direct-address this memory, for ultimate control and performance. Multiple cards may be installed with full driver support under Windows 9x/NT/2000.





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## Development Tools

First time buyers of the M6x will need to purchase the M6x DevPack. The DevPack includes the M6x card, Code Composer Studio Integrated Development Environment, CodeHammer JTAG Emulator and Zuma Toolset for the M6x.

Innovative Integration's Zuma Toolset makes DSP development and complex peripheral integration fast and simple with easy-to-use, single command functions. A 300+ target-specific DSP and peripheral function library is provided in source form and is fully documented in an on-line Windows help file.

The Zuma Toolset includes everything from convenient utility applets allowing download, execution and high level debugging of DSP applications to a complete set of source code examples demonstrating full operation of all hardware resources.

The Zuma Toolset is fully supported from within Texas Instruments' Code Composer Studio. This state of the art integrated development environment not only provides editing, compiling, linking, downloading and low level debugging, but also gives access to specific DSP registers and functions when used in conjunction with Innovative Integration's Code Hammer JTAG emulator.

Zuma support extends beyond target DSP development to include host PC code development as well. The toolset includes a real-time, Ring-0 (kernel mode) device driver and a fifty-function DLL which supports optimal-performance communications with the embedded DSP board. The DLL/Driver provides all of the support functions needed to download code to the embedded DSP, control the card operation and implement bidirectional data communications at full PCI bus bandwidth - up to 132 MBytes/sec!

A number of examples illustrating use of the DLL/Driver are supplied in Zuma. The example programs highlight everything ranging from host-to-target/target-to-host interrupts to common data passing techniques. The supplied DLL may be readily accessed from within popular PC programming environments like Visual C/C++, Visual Basic, Borland C++ Builder and Delphi to name just a few.

## OEM Configurations

The M6x can be configured to fit your specific requirements and provide an optimal mix of performance, cost and features. Contact Innovative Integration with your specific OEM requirements.





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## Digital Signal Processor

Texas Instruments TMS320C6201 or TMS320C6701 DSP.
64 KB program / 64 KB data memory
(2) multichannel buffered serial ports
(2) 32-bit timers
(4) DMA channels
32-bit external memory interface
DSP speed up to 200 MHz, depending on configuration

## Memory

16 MBytes synchronous DRAM (one wait-state)
1 MByte synchronous burst SRAM (one wait-state, optional)
512 KBytes asynchronous SRAM

## Debug Port

JTAG 1149.1 compliant emulation port
Compatible with Innovative Code Hammer, TI XDS-510, or equivalent debugger using TI Code Composer Studio

## PCI/CompactPCI Bus

32-bit PCI bus
Advanced 2nd generation PCI bus controller
Master or slave interface
Bus Mastering interface, capable of 132 MBytes/sec burst transfers
Typical performance 60 MBytes/sec sustained under Windows 9x/NT/2000 Plug-n-Play

## Digital I/O

32-bit programmable as input or output in groups of 8 TTL compatible with 32/-64 mA current capability.

## FIFOPort

Memory mapped FIFOPort 16-bit input and output Input data stream has 512 x 16 FIFO
Writes 80 MB/sec, reads 64 MB/sec

## Timers/Counters

(2) on-chip, 32-bit timers clocked at DSP speed/4

## Clock Generation

(3) 16-bit, counter/timers clocked at 10 MHz or DDS rate

## Multi Card Synchronization

(1) programmable digital frequency synthesizer; 0-25 MHz range in 0.02 Hz steps

## Clock Generation

Synchronize multiple cards to a common trigger or clock using SyncLink/ClkLink
Software selection for master/slave card function
Two High speed LVDS signals for clocks (ClkLink)
Two TTL compatible signals for triggers (SyncLink)

## OMNIBUS I/O Module Sites

(2) expansion sites; Expansion using OMNIBUS modules for analog and digital I/O
Compatible with all OMNIBUS modules
50 module-specific I/O connections per module

## OMNIBUS Bandwidth

6-8 MHz bandwidth on 32-bit bus (modules may require wait-states)

## Connectors

50-pin polarized male pin header for digital I/O
(2) 14-pin polarized male pin headers for JTAG emulation
54-pin male header for FIFOPort
10-pin polarized male pin header for timers
(2) 50-pin polarized male pin headers for I/O modules
(2) DB15 males for I/O modules
(2) 10-pin male header pin headers for serial ports

## Physical Description

Full-length PCI card / 6U CompactPCI
Conforms to PCI specification
Max component height 0.70 inches

## Power Requirements

M6x: +5 V @ 1.0 A
cM6x: ±12 V
(OMNIBUS module dependent)

## Operating Conditions

10°-55° C

## Development Languages

### DSP

C or Assembler for DSP
Code Composer Studio
Zuma Toolset.

### PC

Microsoft Visual C++
Borland C++ Builder Visual Environment

## C/Assy Source Debugger

Code Hammer with Code Composer Studio Debugger

## Operating Systems

Virtuoso OS from Wind River
DSP/BIOS II

## TMS320C6701 Benchmarks @160 MHz

| Benchmark Algorithm | Speed |
|---|---|
| 1024 Point Complex FFT (Radix 4, with reversal) | 108µsec |
| FIR Filter (per tap) | 12.5nsec |
| IIR Filter (per biquad) | 25nsec |
| Matrix Multiply | |
| [3x3]*[3x1] | 437nsec |
| [4x4]*[4x1] | 750nsec |
| Divide (y/x) | 175nsec |
| Inverse Square Root | 212.5nsec |

## Software Selection Guide for M6x

| Software Package | Description | Usage/Requirements | Page | Recommendations |
|---|---|---|---|---|
| **Zuma Toolset** | Peripheral libraries needed for developing code on this card. Includes host applications and target examples in source form demonstrating use of peripherals on the card. | Requires CCStudio*. Windows2000/XP compatible. | 94 | Required for all first time users. Includes 1 year of technical support. |
| **M6x DLL** | Dynamic link library (DLL) for the M6x. | Requires ANSI-compliant C/C++ compiler. For example, Microsoft Visual C/C++. Windows2000/XP compatible. | 61 | Required for interfacing Host side code to DSP. |
| **CCStudio 'C6000** | Integrated development environment (IDE) for Target side development/debugging from Texas Instruments. | Requires XDS-510 compatible JTAG emulator for debugging capabilities. | 91 | Required for all first time users. Recommend use with Innovative Integration plug-n-play PCI JTAG emulator. |
| **Code Hammer** | Plug-n-play PCI JTAG emulator. | Code Composer Studio. | 102 | Recommended for all developers of code on the M6x. |

The M6x Development Package contains all software packages listed above.

*Contact Innovative Integration for current release version.





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