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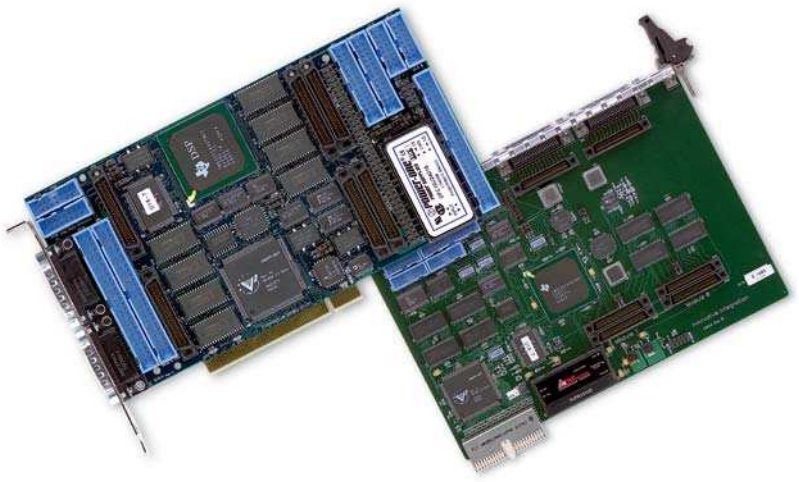
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Find the *Molex / Innovative Integration PC31* at our website: ***Click HERE***

M44/cM44

32-bit Floating Point DSP
60 MFLOPS
Dual OMNIBUS I/O Module Sites
TMS320C44 DSP



Overview
The M44 is a PCI bus-based, flexible I/O engine featuring a floating point DSP and dual OMNIBUS module I/O expansion sites. The M44's modular approach to peripheral I/O means flexibility for the OEM. Custom modules can be easily and inexpensively integrated to suit the specific needs of your application. Its low cost architecture makes the M44 an excellent choice for volume applications.

Processor Core
The TMS320C44 32-bit floating-point DSP processes data at up to 60 MFLOPS / 30 MIPS. On-chip peripherals include two 32-bit counter/timers, six DMA channels, 8 KBytes of dual-access SRAM, four bidirectional COMM ports and a prioritized interrupt controller. Memory on the M44 may be expanded to 2 MBytes of local SRAM plus up to 2 MBytes of global SRAM.

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. The port may be software or externally clocked at rates to 7 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. An onboard 82C54 augments the on-chip timer and DDS to provide three additional 16-bit counter/timer channels that are often used as analog I/O and servo time bases. These timers may be driven by either the DDS output or an onboard 1 MHz oscillator.

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 'C44 COMM port linkages are useful to support dedicated board-to-board communications between multiple M44s and any other 'C4x-based DSP boards at rates to 20 MBytes/sec.

Host PC Interface
The M44 is a standard 32-bit, half-size PCI card. Global SRAM, 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 'C44 processor to the host PC's driver memory pool at sustained rates of 80 MBytes/sec. During bus master transfers, the M44 is free to perform data collection and analysis functions. The global SRAM 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.

Features
- 60 MHz TMS320C44 Processor
- Two OMNIBUS I/O Module Sites
- PCI or CompactPCI Interface
- Two 20MBytes/sec External COMM Ports

Applications
- Servo Control
- Real Time Data Acquisition
- Audio Processing

Hardware Options
- Local SRAM upgrade to 2 MB
- Global SRAM upgrade to 2 MB
- 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
- Code Hammer / Debugger pg 102
- TI Code Composer 3x-4x

Not Recommended for new design.
Use M6x instead.

Ordering Information 'c' denotes CompactPCI

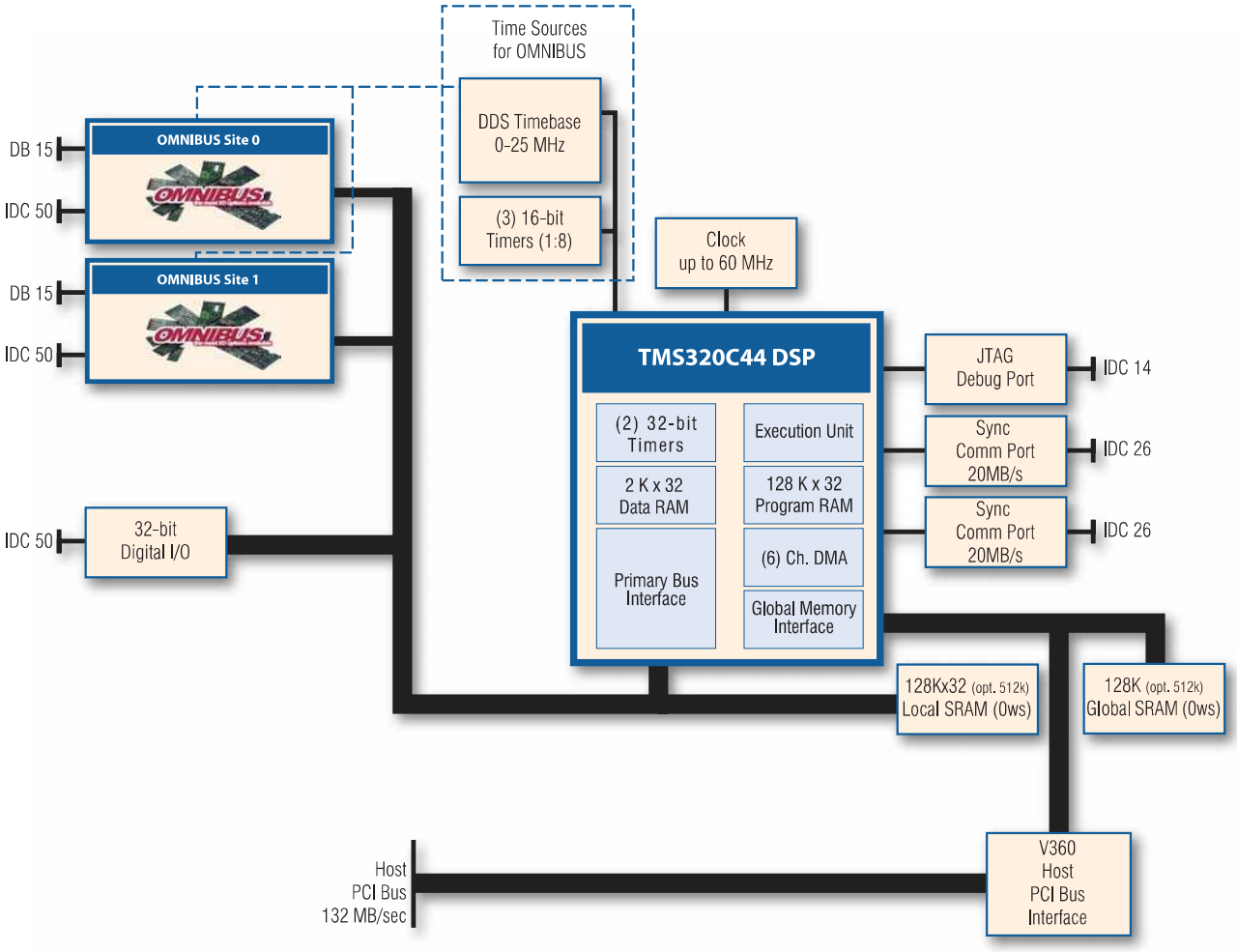
M44	80010-2
M44 DevPack	90010-0
cM44	80014-1
cM44 DevPack	90014-0



DevPack Available

See page 91 for details

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Development Tools

First time buyers of the M44 will need to purchase the M44 DevPack. The DevPack includes the M44 card, Code Composer 3x-4x Integrated Development Environment, CodeHammer JTAG Emulator and Zuma Toolset for the M44.

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 3x-4x. 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 M44 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

60 MHz Texas Instruments TMS320C44
60 MFLOPS 32-bit floating-point DSP

On-chip resources

2 K x 32 data RAM
128 K x 32 program RAM
Hardware multiplier
(6) DMA controllers
(4) 20 MB/sec COMM ports
(2) 32-bit timers
(16) prioritized interrupts, 128 Word instruction cache
DSP speed is

Memory

Independent local and global memory spaces
128 K x 32 local and 128 K x 32 global memory standard (0 wait-state).
Expandable onboard to 512 K x 32 global, 512 K x 32 local

Debug Port

JTAG 1149.1 compliant emulation port
Compatible with Innovative Code Hammer, TI XDS-510, or equivalent C/Assembler debugging using Code Composer software

PCI/CompactPCI Bus

PCI bus master/slave 32-bit 5 V
Consumes 256 bytes of host I/O space, 1 MByte host memory space, 1 interrupt, 128 KW global memory (optional upgrades of 512 KW) and one interrupt host
PC can access 'C44 global SRAM directly
Plug-n-Play compliant

COMM Port Connections

(2) buffered COMM ports for system expansion.
(2) COMM ports to OMNIBUS module I/O slots
20 MBytes/sec each

Digital I/O

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

Timers/Counters

Three 16-bit timers driven by DDS or 1 MHz clock module

Clock Generation

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

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

Connectors

(2) DB15 female for I/O
IDC40 male for digital I/O
IDC26 male for COMM ports
IDC14 male for JTAG 1149.1 port
(2) IDC14 for mux control
(2) IDC 50 for I/O

Physical Description

Standard PCI half-card / 6U CompactPCI

Power Requirements

+5 V DC @ 1.2 A, plus modules installed.

Development Languages

DSP

C or Assembler for DSP
Code Composer
Zuma Toolset.

PC

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

C/Assy Source

Code Hammer
Zuma Toolset
Code Composer
Debugger

TMS320C44 Benchmarks @ 60 MHz

Benchmark Algorithm	Speed
1024 Point Complex FFT	650 μsec
FIR Filter (per tap)	33nsec
IIR Filter (per biquad)	133nsec

Note:

The M44 is not recommended for new design development. M6x is recommended as an alternative.

Software Selection Guide for M44

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 Code Composer C3x-C4x. Windows98/NT/2000 compatible.	94	Required for all first time users. Includes 1 year of technical support.
M44 DLL	Dynamic link library (DLL) for the M44.	Requires ANSI-compliant C/C++ compiler. For example, Microsoft Visual C/C++. Win 98/NT/2000 compatible.	64	Required for interfacing Host side code to DSP.
Code Composer 'C3x-'C4x	Integrated development environment (IDE) for Target side development/debugging from Texas Instruments.	Requires XDS-510 compatible JTAG emulator for debugging capabilities.		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 C3x-C4x.	102	Recommended for all developers of code on the M44.

The M44 Development Package contains all software packages listed above.

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