MicroLAB Systems

TORNADO-44

Low Cost Floating Point TMS320C44 DSP System and TMS320 Emulator for ISA Bus Host Computers

features

- 60 MFLOPS 32-bit TMS320C44 DSP
- DSP local bus (LB) with 64K...1024x32 0ws SRAM (LSRAM), or 64K...256Kx32 FLASH memory (LFM) or up to 1Mx8 EPROM (LEPROM)
- on-board 256K...1024Kx32 0ws (GSRAM)
- on-board shared global bus (SGB) architecture with shared GSRAM/PIOX resources and SGB masters comprising of DSP and host ISA bus memory I/F
- SGB access from host via ISA bus memory page
- stand-alone operation with the program located in LFM or bootload from EPROM, link port or PIOX I/F
- build-in device serialisation code
- flexible modular system architecture
- compact 2/3 PC/AT board
- low cost

memory and I/O expansion

- parallel I/O expansion (PIOX) I/F connector for *TORNADO* PIOX daughter card modules
- PIOX AD/DA and digital I/O (DIO) modules
- PIOX memory expansion modules
- link I/O expansion (LIOX) I/F connector for high-speed AD/DA/DIO LIOX daughter card modules

multiprocessor expansion

- four link ports for kinking into multiprocessor system
- PIOX-coprocessors *TORNADO-PX* for low cost multiprocessing with shared memory and mixed DSP platforms
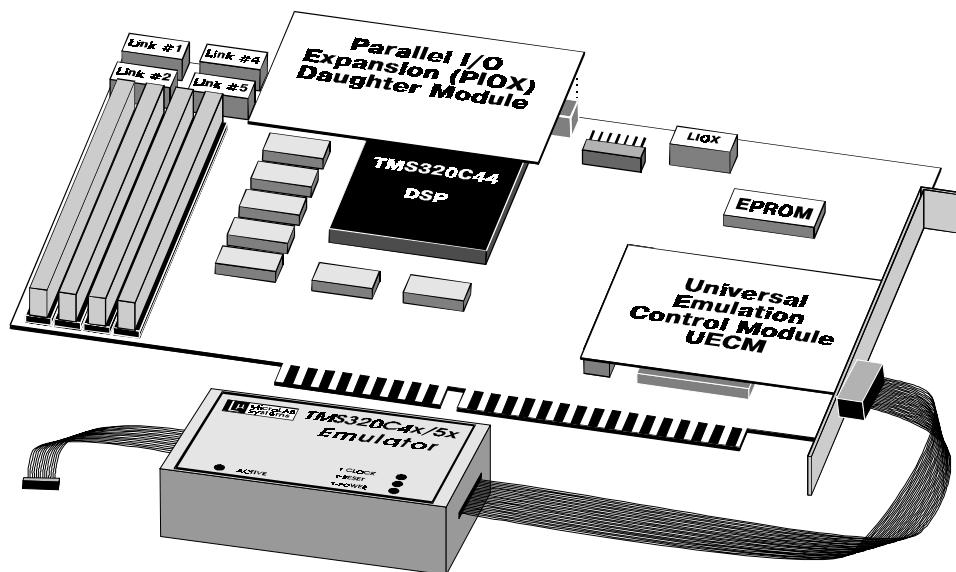
software development tools

- JTAG port for XDS510 and *MIRAGE-510D* emulators
- optional low cost *UECM* daughter module
    - þ identical to XDS510 and *MIRAGE-510D*
    - þ emulation of the on-board TMS320C44 DSP
    - þ optional MPSD/JTAG active buffer pod facility for emulation of any external TMS320 DSPs
    - þ TI C Source Debugger and Go DSP Code Composer IDE
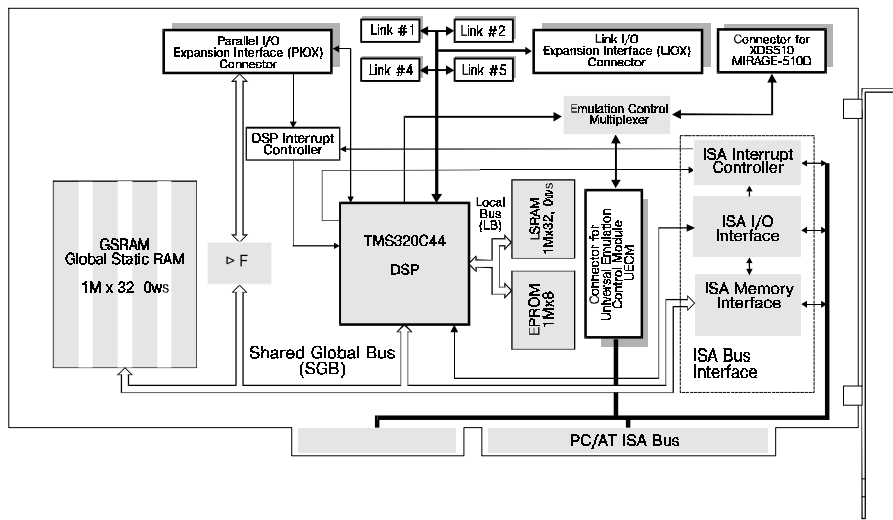- TI Floating Point DSP C/Assembler compiler and 3L Parallel C

application software

- Virtuoso, SPOX and Nucleus RTX/PLUS real-time operating systems
- Hypersignal tools for DSP algorithm development
- DSP, math, vector and communication functions
- host control functions and utilities

applications

- real-time DSP, data acquisition and signal analysis
- multiprocessor DSP systems
- audio, speech processing, communication
- instrumentation
- medical
- image processing
- radars
- industrial
- TMS320 DSP systems development/diagnostics

Parallel I/O Expansion Interface (PIOX) Connector — Link #1 — Link #2 — Link I/O Expansion Interface (LIOX) Connector — Connector for XDS510 MIRAGE-510D

Link #4 — Link #5

Emulation Control Multiplexer

DSP Interrupt Controller

ISA Interrupt Controller

GSRAM Global Static RAM 1M x 32 0ws — ▷ F — TMS320C44 DSP — Local Bus (LB) — LSRAM 1Mx32, 0ws — Connector for Universal Emulation Control Module UECM — ISA I/O Interface

EPROM 1Mx8 — ISA Memory Interface

Shared Global Bus (SGB) — ISA Bus Interface

PC/AT ISA Bus

TORNADO-44 is a high performance, flexible and low cost DSP platform for single- and multiprocessor real-time signal acquisition, floating point DSP and TMS320 DSP systems development and dignostics.

Ultimate benefit of *TORNADO-44* is the on-board shared global bus (SGB) architecture, that has been optimised for high performance on-board data processing and in-parallel high speed data transfers between the on-board GSRAM/PIOX shared resources and host ISA bus memory I/F without consuming virtually any DSP time. Host software can easily access any SGB data via ISA bus UMB mapped memory page.

For system expansion and real-time signal acquisition *TORNADO-44* provides parallel (PIOX) and link (LIOX) I/O expansion I/F connectors for optional AD/DA, digital I/O and memory expansion daughter card modules.

TORNADO-44 exploits all unique multiprocessor expansion facilities of TMS320C44 DSP. Foremost, all four DSP on-chip link ports are available for easy and low cost linking into a multiprocessor DSP system with transputer-like "hypercube" architecture. Furthermore, a variety of available PIOX-coprocessor daughter card modules deliver ready-on multiprocessor DSP solutions with shared memory architecture.

TORNADO-44 provides the on-board JTAG emulation port, which is compatible with the TI XDS510 and MicroLAB Systems *MIRAGE-*

510D scan-path emulators and is used to debug the on-board TMS320C44 software. Also, optional low cost *UECM* universal emulation control daughter card module for *TORNADO* DSP systems is available. *UECM* is identical to XDS510/*MIRAGE-510D* emulators and runs under the industry standard TI C Source Debugger and Go DSP Code Composer IDE. When installed onto *TORNADO-44* board, *UECM* automatically connects to emulation port of the on-board TMS320C44 DSP. *UECM* also delivers optional MPSD/JTAG active buffer pod facility for emulation of any external TMS320 DSP that converts *TORNADO-44* into universal development system.

TORNADO-44 software can be developed with the TI floating point DSP C/Assembly tools and 3L Parallel C. A variety of compatible real-time operating systems, DSP algorithm development tools and application specific function libraries are available from multiple software vendors.

TORNADO-44 provides optional facility for standalone operation with start-up program either located in local flash memory or bootloaded from LEPROM, link port or PIOX I/F.

Flexible and expandable modular construction of *TORNADO-44* delivers ready-on solutions for wide selection of applications and is open to meet your requirements while keeping a cost of project to a minimum.

Technical Specifications

processor
TMS320C44 floating point DSP, 32 bits, 60 MHz

on-board memory
Up to 1024Kx32 0ws/2ws LSRAM/LFM. Up to 1024Kx32 0ws GSRAM. Up to 1Mx8 3ws LEPROM (PLCC).

host ISA bus memory and I/O interfaces
ISA bus UMB mapped 32KB memory page for GSRAM/PIOX data access. Eight ports in the ISA bus I/O space. Nine lines for PC IRQ.

multiprocessor link ports
Four edge connectors for DSP on-chip link ports.

Link I/O expansion interface (LIOX)
One site for LIOX daughter card module. Includes the DSP link ports #2/#5, DSP on-chip timers control, IRQ lines, reset, PC power lines.

Parallel I/O expansion interface (PIOX)
One site for PIOX daughter card module. Includes SGB address (31) and data (32) buses, DSP on-chip timers, IRQ lines, reset, PC power lines.

Physical/power
2/3 PC/AT card: 237x125mm (9.3"x4.9"). Occupies one PC/AT ISA slot. Power consumption (with 256Kx32 LSRAM/GSRAM and *UECM* installed): 5V@3.2A

warranty
Full one year warranty with on-line technical support.

MicroLAB Systems Ltd

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