

features

- two on-board 60 MFLOPS 32-bit TMS320C40 DSPs
- DSPs local buses with 64K...1024Kx32 0ws SRAM (LSRAM-A/B), or 128K...256Kx32 FLASH memory (LFM-A/B) or 1Mx8 EPROM (LEPROM-A/B)
- on-board 64K...1024Kx32 0ws SRAM (GSRAM)
- on-board shared global bus (SGB) architecture with shared GSRAM/PIOX resources and SGB masters comprising of DSPs and host ISA bus memory I/F
- SGB access from host via ISA bus memory page
- optional standalone operation with the programs lo-cated in LFM-A/B or bootload from EPROMs, link port or PIOX I/F
- build-in device serialisation code
- flexible modular system architecture
- available in single DSP version with further upgrade to dual DSP version

memory and I/O expansion

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

multiprocessor support and expansion

- DSP-to-DSP communication via SGB resources
- optional on-board 8Kx32 1ws dual-port RAM (DPRAM) with hardware semaphores at local buses of DSPs for delay free DSP-to-DSP data transfers
- two link ports of each DSP are cross-connected
- four link ports of each DSP available for linking into a multiprocessor system

- PIOX-coprocessors *TORNADO-PX* for low cost multiprocessor DSP systems with shared memory and mixed DSP platforms

software development tools

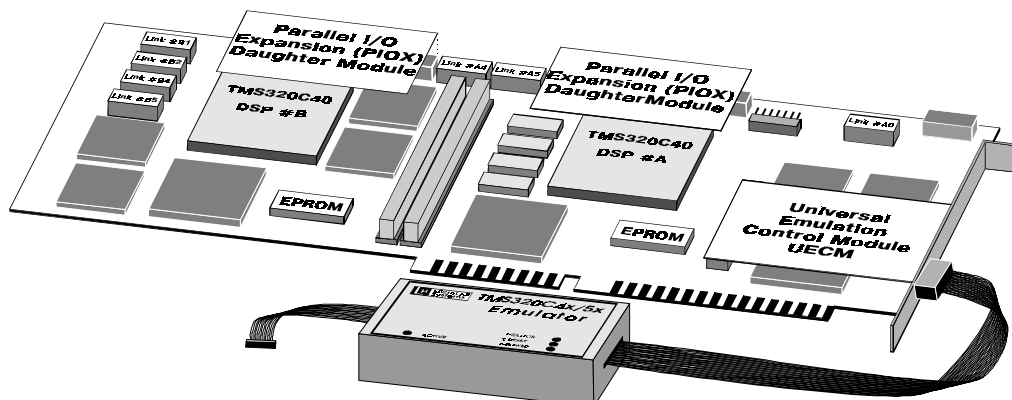
- JTAG port for XDS510 and *MIRAGE-510D* emulators
- optional low cost *UECM* daughter module
 - identical to XDS510 and *MIRAGE-510D*
 - emulation of the on-board TMS320C40 DSP
 - optional MPSD/JTAG active buffer pod facility for emulation of any external TMS320 DSPs
 - TI C Source Debugger and Go DSP Code Composer IDE
- TI Floating Point DSP C/Assembler compiler and 3L Parallel C

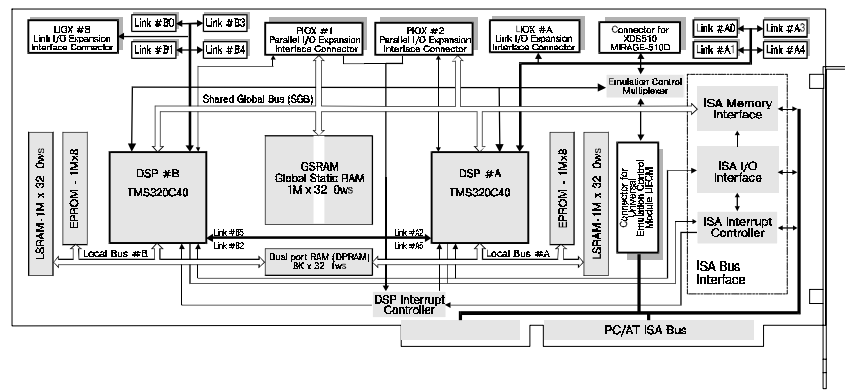
application software

- 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
- image processing
- instrumentation
- medical
- radars
- industrial
- TMS320 DSP systems development/diagnostics





TORNADO-40D is a powerful, high performance and flexible multiprocessor DSP platform for real-time signal acquisition, floating-point DSP and TMS320 DSP systems development and diagnostics.

Ultimate benefits of *TORNADO-40D* are the on-board shared global bus (SGB) architecture and a variety of on-board DSP-to-DSP communication facilities. SGB is shared by both on-board TMS320C40 DSPs and host ISA bus interface (I/F) and 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 DSPs time. Host software can easily access any SGB data via ISA bus UMB mapped memory page.

For and real-time signal acquisition *TORNADO-40D* provides two parallel (PIOX) and two link (LIOX) I/O expansion I/F connectors for AD/DA, digital I/O daughter card modules.

TORNADO-40D exploits all unique multiprocessor expansion facilities of TMS320C40 DSPs. Foremost, the on-board DSPs can communicate via shared GSRAM or optional on-board dual-port RAM (DPRAM) which connects between local buses of DSPs and provides delay free DSP-to-DSP data transfers. Furthermore, two link ports of DSPs are cross connected and other four link ports of each DSP are available for low-cost linking into a multiprocessor DSP system with "hypercube" architecture. Lastly, a variety of PIOX-coprocessor daughter card modules deliver ready-on multiprocessor solutions with shared memory architecture and mixed DSP platforms.

TORNADO-40D 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 TMS320C40 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-40D* board, *UECM* automatically connects to emulation port of the on-board TMS320C40 DSP. *UECM* also delivers optional MPSD/JTAG active buffer pod facility for emulation of any external TMS320 DSPs that converts *TORNADO-40* into universal development system.

TORNADO-40D 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-40D provides optional facility for standalone operation with start-up program either located in local flash memory or bootloaded from LEPROMs, link port or PIOX I/F.

Flexible and expandable modular construction of *TORNADO-40D* 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

processors

Two TMS320C40 floating point DSPs, 32 bits, 60 MHz

on-board memory

Up to 1024Kx32 0ws/2ws LSRAM-A/B/LFM-A/B. Up to 1Mx8 LEPROMs. Up to 1024Kx32 0ws GSRAM. DPRAM 8Kx32 1ws with hardware semaphores/interrupts.

host ISA bus memory and I/O interfaces

ISA bus UMB mapped 32KB memory page for GSRAM/ PIOX access. Eight ISA bus I/O ports. Nine PC IRQ lines.

multiprocessor link ports

Two link ports of each DSP are cross connected and eight link ports are available at edge connectors.

link I/O expansion interface (LIOX)

Two sites for LIOX daughter card module. Includes the DSP link ports #2/#5, DSP on-chip timers control, IRQ lines, DSP reset, PC power lines.

parallel I/O expansion interface (PIOX)

Two sites for PIOX daughter card modules. Includes SGB address (31) and data (32) buses, DSP on-chip timers control, IRQ lines, reset, PC power lines.

physical/power

Full size PC/AT card: 340x125mm (13.3"x4.9"). Occupies one PC/AT ISA slot. Power consumption (with 128Kx32 LSRAM-A/LSRAM-B/GSRAM and *UECM* installed): 5V@4.8A

warranty

Full one year warranty with on-line technical support.