

CIC-500

DSP DEVELOPMENT AND EXPERIMENT SYSTEM



CIC-500 is a DSP development system designed for learning DSP hardware implementations. The system combines both DSP chip for signal processing and FPGA chip for I/O control. With various built-in I/Os and several implementation examples, ranging from basic DSP theory to advanced DSP applications, users are able to learn DSP implementations efficiently.

CIC-520 DSP Interface and Control Unit

1. SN-DSP54B DSP Interface Control Board

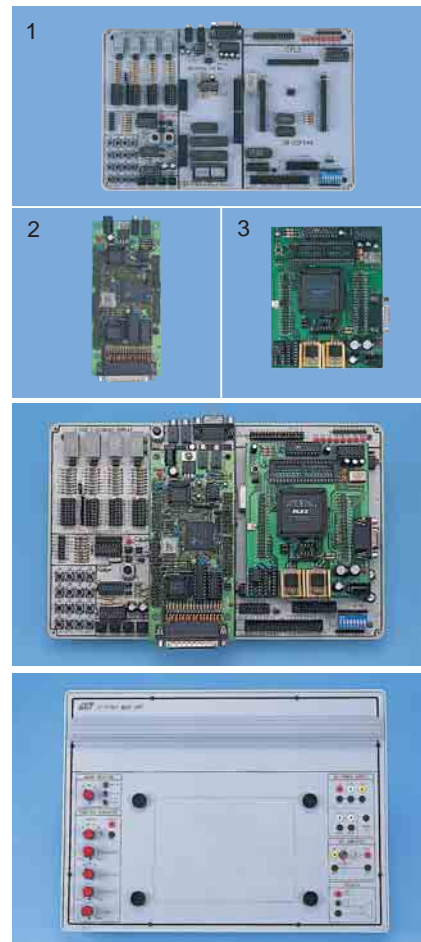
- (1) Open collector power IC: ULN 2803 50V/500 mA x 8
- (2) Analog signal inputs: Microphone amplifier
- (3) Audio input amplifier and DTMF generator
- (4) 4 sets of pulse generator: A, B, C and D
- (5) 8 DIP switches for data input and 8 LEDs for displaying output state
- (6) 4-digit 7-segment LED display, 4x4 keypad

2. SN-DSP542D Control Unit

- (1) CPU : TMS320C542, 40 MHz operating frequency against RFI interference
- (2) Internal memory : 10 K x 16 DRAM
: 2 K x 16 Boot ROM
- (3) External memory : 32 K x 8 EPROM for program storage and standalone.
: 32 K x 16 Catch SRAM for memory expansion
- (4) A/D and D/A converters : TLC320AC01, 14 Bit-CODEC
- (5) HPI Interface : Printer port for program loading and debugging
- (6) TDM: Serial port.

3. SN-PLDE2 CPLD-EPF8K Interface Unit

- (1) FPGA device: ALTERA FLEX 8000 series - EPF8282 ALC84-4, 84 pin
- (2) Maximum 8 K x 4 SEEPROM for program storage
- (3) RS-232 cable for program download



Main Unit (CI-51001)

1. Function Generator:

- (1) Range : 1 Hz ~ 100 KHz
- (2) Output waveform : sine, square, triangle and sweep
- (3) Adjustable signal amplitude

2. OCL Amplifier:

- (1) Available gain: 1 and 10
- (2) Driving output: $\pm 12V/1A$ (max) with current limit overload protection
- (3) Direct coupling I/O with auto zero voltage compensation
- (4) Capable of driving DC servo motor, PWM for temperature control and high power speaker

3. Audio Selector :

FG, MIC and CD player input

4. Speaker :

0.5 W/ 8 input plug (2 mm/3.5 ϕ)

5. Fixed DC Power :

- (1) Output voltage/current : +5V/1A, $\pm 12V/0.5A$, +24V/1.0A (ground independent output)
- (2) Output overload protection:
Output overload and short protection, auto power off

6. Module fixed slide rail :

Length 380 mm

Optional Modules

1. DC Servo PWM Control (CI-53001)

- (1) DC 12 V/500 mA servo motor with external driver
- (2) Coaxial encoder 100 P/REV, A and B phase 5 V output pulse, 4 times frequency
- (3) F/V converter for speed detection and fix-speed control
- (4) Speed controlled by FPGA and DSP

2. Step Motor Control (CI-53002)

- (1) Step motor (5 V/1 A single-phase, 5 lines). Available for
- (2) full-step and half step driving of single-pole, double-pole, and single / double - pole circuit
- (3) PWM with constant current and high speed driving control
- (4) Position controlled by FPGA and DSP

3. Temperature Control (CI-53003)

- (1) PWM for power driving control (24 V/1 A) and load (resistor) heating
- (2) SSR for zero point ON/OFF isolation to drive AC circuit (110 V/1 A) for load heating
- (3) DC 12 V/1.7 W fan for temperature control
- (4) AD590 for temperature sensing and temperature detecting (100 mV/1°C)
- (5) Temperature controlled by FPGA and DSP

4. PLC I/O Interface (CI-53004)

- (1) 8 isolated input switches monitored by LED
- (2) Convert 24 V/0 V input to 5 V/0 V digital level for FPGA isolation input
- (3) 8 isolated output coupling with relay and monitored by LED
- (4) Mechatronics application controlled by FPGA and DSP

5. OCL Amplifier (CI-53006)

- (1) Available gain 1 and 10 for different signal power amplification
- (2) Driving output: $\pm 12 V/1 A$ (max) with overload protection
- (3) Direct coupling I/O with auto zero compensation voltage
- (4) Capable of driving DC servo motor, PWM for temperature control, and high power speaker



CI-53001



CI-53002



CI-53003



CI-53004



CI-53006

Development Software Features

1. WINDOWS 95/98 environment
2. Built-in TMS320C5X algebraic assembler allow users to perform the following programming functions: editing, assembling, linking, disassembling, modifying, loading, debugging and testing
3. The contents of registers and memory can be displayed, modified, and filled by the user
4. Source program code can be assembled in INTEL HEX format and then loaded into external EEPROM to form an independent system
5. Other functions: Infinite break point setting, Step Into, Step Over, Step Out, RUN, HALT and RESET
6. FPGA programming and simulation by Altera MAX+PLUS[®]II

List of Experiment

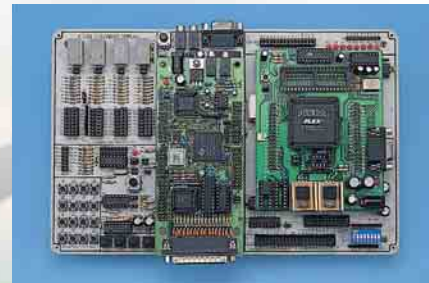
1. Sampling theory
2. TMS320C542 assembly language
3. Testing convolution integration
4. Discrete fourier transform (DFT) and fast fourier transform (FFT)
5. Fast algorithm for correlation and convolution
6. Finite impulse response (FIR) filter
7. Infinite impulse response (IIR) filter
8. Designing digital oscillator
9. Low-Frequency spectrum analysis
10. Designing Waveform generator
11. A-LAW and μ -LAW compandor
12. Speech compress, encode control development
13. Peripheral application control :
 - (1) DC Servo PWM Control
 - (2) Step Motor Control
 - (3) Temperature Control
 - (4) PLC I/O Interface Control

Accessories

1. RS-232 cable x 1 set
2. Interface connect bus x 1 set
3. Experiment lead x 1 set
4. Adapter x 1 set
5. Operation manual

Order Information

1. CIC-520 DSP Simple Version Package:
Include CIC-520, development software and accessories
2. CIC-500 DSP Standard Version Package:
Include CIC-520, CI-51001, development software and accessories
3. CIC-500 DSP Complete Version Package:
Include CIC-520, CI-51001, optional modules, development software and accessories



CIC-520 DSP Simple Version



CIC-500 DSP Standard Version