

## Rapid Product Development System

*MityDSP is a high performance DSP platform that accelerates the Product Development Cycle.*

Development Platform + Production Hardware

# All-in-One

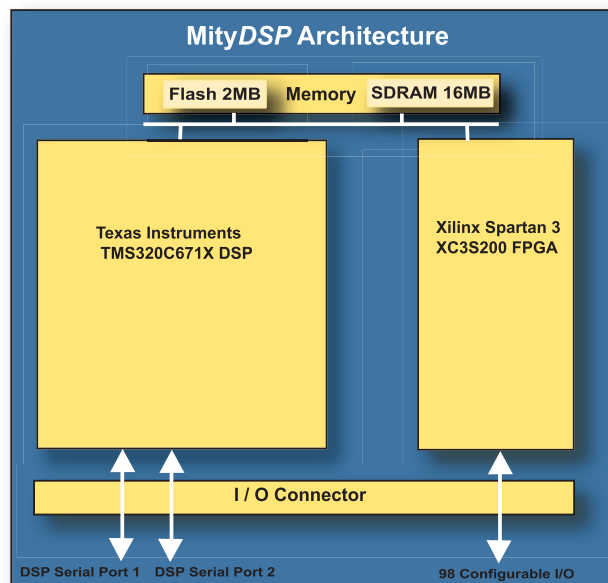


### Bring New Products to Market Faster

- Migrate your idea or proof of concept to a completed product quickly and efficiently
- Significantly reduce development cost and schedule
- Off-the-shelf **MityDSP** hardware is production ready
- Use the same platform for development and production
- Easily customizable - develop spin-off products even more quickly

### Save Time and Money

- Accelerate your design cycle – we've already done the hard work!
- Begin your design with the basics already in place
- Processing engine (HW & SW) designed, built, integrated and tested
- Integrated FPGA ready for custom high speed data acquisition, processing and control
- Designed to be easily customizable to your application
- Drop-in hardware and software modules reduce your development cost and schedule



**MityDSP** off-the-shelf processing engine core enables rapid prototype development and time-to-market advantages for a wide range of data-intensive applications. With the processing engine core complete, you can focus on the development of your custom application more quickly than with a ground-up development.

Critical Link is your design partner for **MityDSP** development. We offer a suite of design tools to jump start your product development. The **MityDSPEvaluation Board** allows quick and easy system level design and implementation of signal processing applications.

## Applications

The **MityDSP** is suited for a wide range of product applications. Key applications include image processing, spectroscopy, measurement systems, audio processing, industrial control and signal processing. The compact form factor makes **MityDSP** perfect for small enclosures and portable applications. Ethernet and serial connectivity options allow for host or network connectivity.

### Application Areas

- Spectral Analysis
- Audio Processing
- Image Processing
- Data Collection
- Motor Control
- Vibration Measurement
- Surface Measurement
- Optical Measurement

Product	MityDSP Role
<b>Non-invasive glucose monitor</b>	Pressure and touch sensor monitoring
<b>ROA spectrometer</b>	Motor/shutter control, image acquisition / processing
<b>Scientific camera</b>	CCD timing and control, image acquisition and processing
<b>Multichannel temperature monitor</b>	Temperature monitoring and thermocouple linearization
<b>Zero-contrast bar code reader</b>	Image processing, information extraction and decoding
<b>Raman microscope</b>	CCD timing control, laser control, binning and image processing

### Key MityDSP Functions

Category	Application	DSP	FPGA	I/O	Host	
Communication	Serial	✓ Message Parser	✓ UART (multiple)	✓ RS-232 / RS-422	✓ Message Parser	
	Ethernet	✓ UDP Stack / Parser	✓ MAC	✓ Phy (10BaseT / 100BaseT)	✓ Message Parser	
	SPI	✓	✓	✓		
	I2C	✓	✓	✓		
	Digital I/O	✓	✓	✓ Relay, opto, open-collector, current-loop		
Sensor	Temperature	Thermocouple	✓ Data acquisition	✓ ADC, DAC setup and control	✓ Analog conditioning / ADC	
		Thermistor	✓ Data acquisition	✓ ADC, DAC setup and control	✓ Analog conditioning / ADC	
	Pressure	Pressure gauge	✓	✓	✓	
		Touch sensor	✓	✓	✓	
	Photodetector	Absorption interferometry	✓	✓	✓ Transimpedance amplifier	
	Imaging	CCD	✓	✓ Timing generation, binning data FIFO	✓	✓ Spectroscopy sample application, sample DLL
CMOS		✓	✓ Timing generation, data FIFO	✓		
Motor Control	Synchronous		✓ PID loop, PLL, commutation	✓ H-bridge drivers		
	DC		✓	✓		
	Stepper	✓	✓ Micro-stepping	✓ H-bridge drivers		
Laser Control	Diode laser	✓	✓	✓		
TE Cooling	CCD / Laser temp. control	✓	✓	✓		
Signal Processing	FFT	✓	✓			
	FIR filtering	✓	✓			
	IIR filtering	✓				
	Demodulation / Detection	✓	✓			

## Specifications

### Texas Instruments TMS320C6711

#### Floating Point DSP

##### Clock Rate

- Input clock 25MHz
- 200 MHz internal clock rate (via internal PLL)
- Interface (EMIF) 50 MHz

##### Performance

- 600 MFLOPS

##### Memory Architecture (Cache)

- 32K-Bit (4K-Byte) Program Cache (L1P)
- 32K-Bit (4K-Byte) Data Cache (L1D)
- 512K-Bit (64K-Byte) RAM / Cache (L2)

##### I/O

- 32 bit wide interface
  - Routed to SDRAM / FPGA / FLASH
- 2 multichannel buffered serial ports (McBSPs)
  - Routed to MityDSP I/O connector

##### Interrupts

- 4 routed to FPGA

##### IEEE-1149.1 (JTAG)

##### Development Tools

- Code Composer

### Xilinx Spartan III XC3S200 FPGA

#### Capacity

- 200K logic cells
  - 100% available for application use

#### Performance

- Input clock 25 MHz
- Internal clock rate up to 300 MHz

#### I/O

- DSP processor bus, 12 address, 32 data, 4 CE, R/W, strobe, hold
  - General purpose I/O
  - 78 configurable I/O pins
    - 3.3V capable
    - Routed to MityDSP connector
  - 20 configurable I/O pins
    - 3.3V or LVDS capable
    - Routed to MityDSP connector

#### IEEE-1149.1 (JTAG)

#### Development Tools

- Xilinx ISE Tools

### Memory Subsystem

#### Flash Memory 2M-byte

- Byte wide interface
- 90ns access time

#### SDRAM 16 M-byte

- 32 bit wide interface
- 10ns burst mode access time (100 MHz)

### Interface Connector

#### 144 pin high density connector

- S.O.DIMM type
- Mating connector part number
  - 5-4189-1440 (Molex)
  - 390110-1 (AMP)
- I/O
  - 98 configurable I/Os (FPGA)
  - 2 McBSP channels (DSP)
  - JTAG (DSP, FPGA)
  - Power, Ground

### MityDSP Pinouts

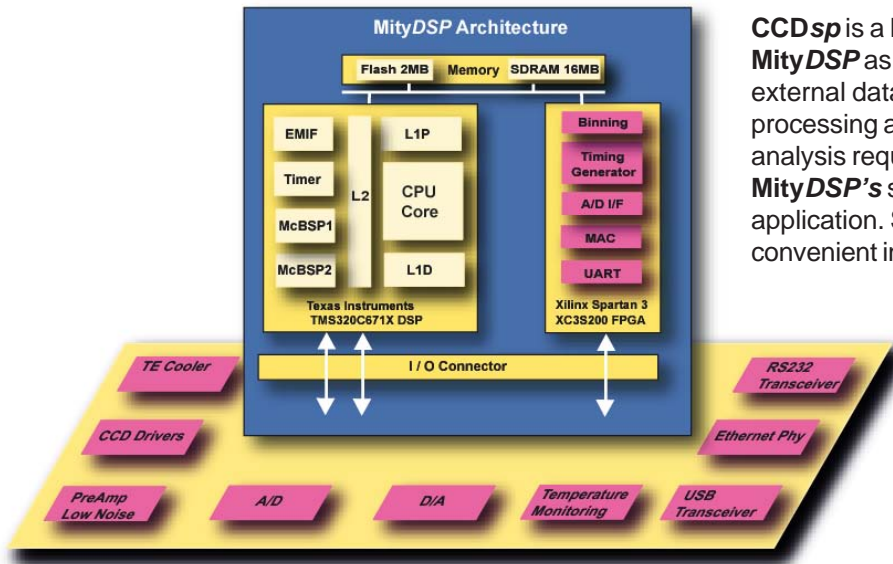
#### Available I/O

Pin	Signal Name	Signal Type	Pin	Signal Name	Signal Type
A1	3.3V	P	B1	3.3V	P
A2	GND	P	B2	GND	P
A3	DSP_TMS	J, I	B3	MRESET	R, I
A4	DSP_TDO	J, O	B4	DSP_TRST	J, I
A5	DSP_TDI	J, I	B5	DSP_EMU1	J, I
A6	DSP_TCK	J, I	B6	DSP_EMU0	J, I
A7	CLKS0	M, IO	B7	CLKS1	M, IO
A8	CLKR0	M, IO	B8	CLKR1	M, IO
A9	CLKX0	M, IO	B9	CLKX1	M, IO
A10	DR0	M, I	B10	DR1	M, I
A11	DX0	M, O	B11	DX1	M, O
A12	FSR0	M, IO	B12	FSR1	M, IO
A13	FSX0	M, IO	B13	FSX1	M, IO
A14	GND	P	B14	GND	P
A15	1.23V	P	B15	1.23V	P
A16	RESET#	R, O	B16	CLKOUT2	C, O
A17	RESET	R, O	B17	CLKOUT3	C, O
A18	GND	P	B18	GND	P
A19	FPGA_TCK	J, I	B19	FPGA_TDO	J, O
A20	FPGA_TDI	J, I	B20	FPGA_TMS	J, I
A21	Available I/O	IO	B21	Available I/O	IO
A22	Available I/O	IO	B22	Available I/O	IO
A23	Available I/O	IO	B23	Available I/O	IO
A24	Available I/O	IO	B24	Available I/O	IO
A25	Available I/O	IO	B25	Available I/O	IO
A26	Available I/O	IO	B26	Available I/O	IO
A27	Available I/O	IO	B27	Available I/O	IO
A28	Available I/O	IO	B28	Available I/O	IO
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A45	Available I/O	IO	B45	Available I/O	IO
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A66	Available I/O	L, IO	B66	Available I/O	L, IO
A67	Available I/O	L, IO	B67	Available I/O	L, IO
A68	Available I/O	L, IO	B68	Available I/O	L, IO
A69	Available I/O	L, IO	B69	Available I/O	L, IO
A70	Available I/O	L, IO	B70	Available I/O	L, IO
A71	GND	P	B71	GND	P
A72	2.5V	P	B72	2.5V	P

Key	
P	Power
J	JTAG
M	McBSP
R	Reset
C	Clock
L	LVDS
I	Input
O	Output
IO	Input/Output

Sample Applications

*CCDsp Scientific Camera*



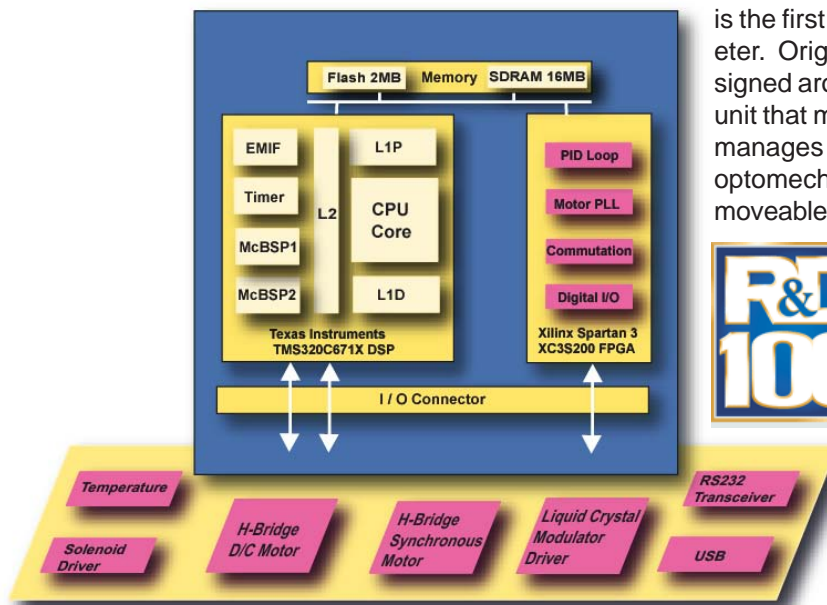
MityDSP I/O Board

**CCDsp** is a high-performance scientific camera that utilizes the **MityDSP** as an on-board data processor, minimizing the need for external data analysis. Because data reduction and analysis processing are performed on-board the camera, data transfer and analysis requirements are reduced for external devices.

**MityDSP's** small form factor is perfect for this 4.5" x 3.5" x 3.5" application. Standard Ethernet, USB and serial ports provide convenient interface options.



*ChiralRAMAN Spectrometer*



MityDSP I/O Board

ChiralRAMAN, winner of the prestigious 2004 "R&D 100 Award", is the first commercial Raman Optical Activity (ROA) Spectrometer. Originally a research instrument, the system was redesigned around the **MityDSP** in order to produce a commercial unit that met manufacturability and cost goals. The **MityDSP** manages the acquisition cycle and all the onboard optomechanical parts such as shutters, optical rotators and moveable optics.

