

# ***UECMX MIRAGE-510DX***

Universal Emulation Control Daughter-card Module  
Dual-channel TMS320 DSP Emulator for ISA-bus Computers

## ***User's Guide***

covers:  
UECMX rev.2A  
MIRAGE-510DX rev.1A

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## About this Document

This user's guide contains description for *UECMX* universal emulation control daughter-card module and for *MIRAGE-510DX* universal dual-channel emulator for TI TMS320 DSP.

This document does not include detail description neither for TI DSP nor for the corresponding software and applications. Please refer to the following original documentation:

1. ***TMS320C3x User's Guide.*** Texas Instruments Inc, SPRU031D, USA, 1994.
2. ***TMS320C4x User's Guide.*** Texas Instruments Inc, SPRU063A, USA, 1993.
3. ***TMS320C5x User's Guide.*** Texas Instruments Inc, SPRU056B, USA, 1993.
4. ***TMS320C2xx User's Guide.*** Texas Instruments Inc, SPRU127A, USA, 1995.
5. ***TMS320C54x User's Guide.*** Texas Instruments Inc, SPRU131B, USA, 1995.
6. ***TMS320C6201/TMS320C6701 Peripheral Reference Guide.*** Texas Instruments Inc, SPRU190B, USA, 1998.
7. ***TMS320C62x/TMS320C67x CPU and Instruction Set.*** Texas Instruments Inc, SPRU189C, USA, 1998.
8. ***TMS320C62x/TMS320C67x Programmer's Guide.*** Texas Instruments Inc, SPRU198B, USA, 1998.
9. ***TMS320C3x C Source Debugger User's Guide.*** Texas Instruments Inc, SPRU053C, USA, 1994.
10. ***TMS320C4x C Source Debugger User's Guide.*** Texas Instruments Inc, SPRU054, USA, 1992.
11. ***TMS320C5x C Source Debugger User's Guide.*** Texas Instruments Inc, SPRU055A, USA, 1994.
12. ***Parallel Debug Manager Addendum.*** Texas Instruments Inc, SPRU094, USA, 1993.
13. ***Code Composer User's Guide.*** Go DSP Corporation, Canada, 1995

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# Chapter 1. Introduction

This chapter contains general description for *UECMX* universal emulation control daughter-card module and for *MIRAGE-510DX* universal dual-channel emulator for TI TMS320 DSP.

## 1.1 General information

*UECMX* universal emulation control daughter-card module (fig.1-1) is designed for emulation control of TI TMS320 DSP. All TI TMS320 DSP with MPSD and JTAG scan-path emulation interfaces are supported.

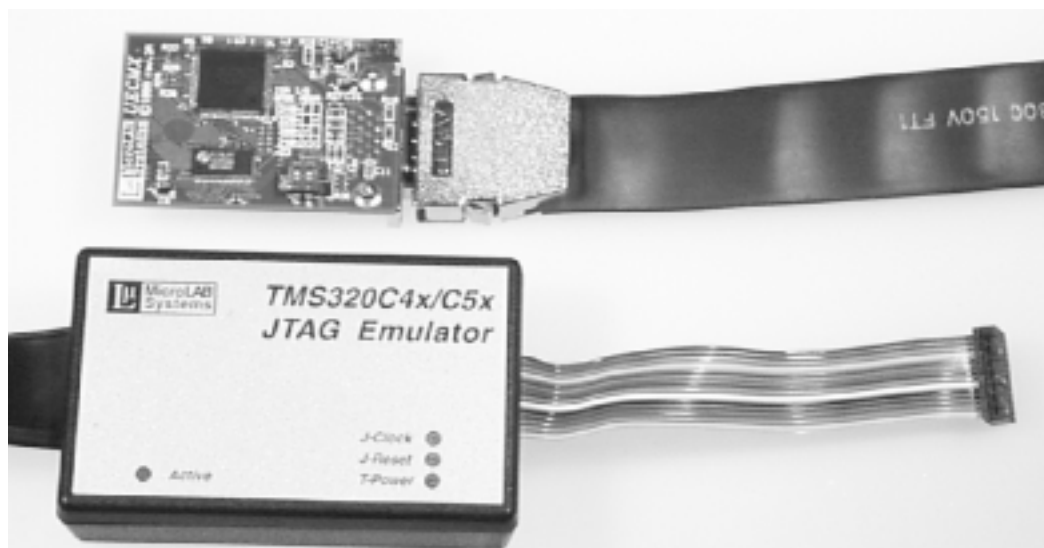


Fig.1-1. *UECMX* module with optional JTAG pod.

*UECMX* installs into the dedicated site either onto *TORNADO* DSP system mainboard (fig.1-2) or onto *MIRAGE-510DX* emulator ISA-bus interface mainboard (fig.1-3).

When *UECMX* is installed onto *TORNADO* DSP system mainboard (fig.1-2), it can emulate either *TORNADO* on-board TMS320 DSP without MPSD/JTAG pod requirement or any external TMS320 DSP via optional MPSD or JTAG pod.



Fig.1-2. *TORNADO-31* DSP system with *UECMX* module and optional pod.

#### CAUTION

Most of *TORNADO* DSP systems with ISA-bus host interface allow installation of *UECMX* daughter-card module. Check with your *TORNADO* board specification for *UECMX* module compatibility.

When *UECMX* is installed onto *MIRAGE-510DX* emulator mainboard (fig.1-3), it can emulate any external TMS320 DSP via JTAG or MPSD pod.

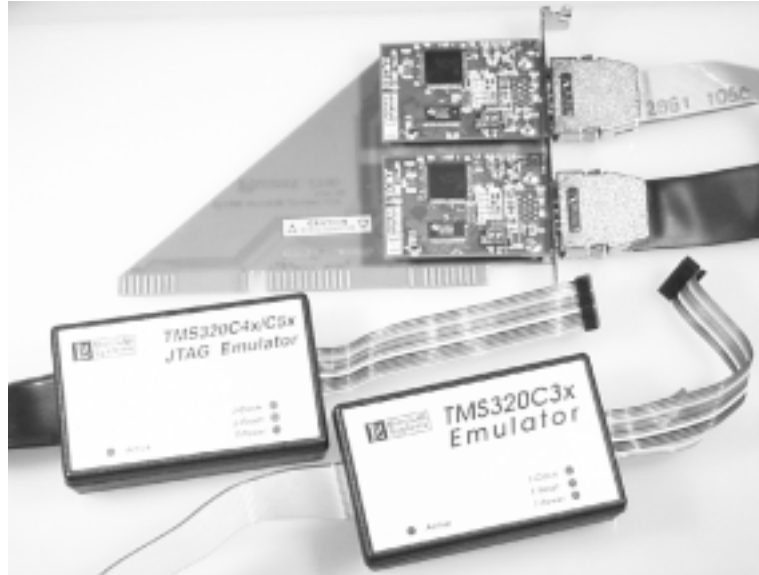


Fig.1-3. *MIRAGE-510DX* emulator ISA-bus interface mainboard with two *UECMX* modules and two pods.

*TORNADO* DSP systems can accommodate only one *UECMX* module, whereas *MIRAGE-510DX* emulator allows installation of up to two *UECMX* modules thus delivering up to two independent emulation channels for TI TMS320 DSP.

### General features

*UECMX* module delivers full set of powerful facilities for development and debugging of TI TMS320 DSP based hardware and software:

- supports both TI MPSPD (TMS320C3x) and TI JTAG (TMS320C2xx/C4x/C5x/C54x/C6x/C8x) scan-path interfaces
- installs as daughter-card module either into dedicated site onto *TORNADO* DSP system mainboard for ISA-bus PC or into any of two available sites onto *MIRAGE-510DX* emulator ISA-bus interface mainboard
- provides two independent emulation channels when two *UECMX* modules are installed onto *MIRAGE-510DX* emulator ISA-bus interface mainboard
- provides two on-board emulation interface ports for connection to scan-path emulation interface of either *TORNADO* on-board DSP without external MPSPD/JTAG pod requirement or of any external TI TMS320 DSP via optional MPSPD/JTAG pod
- supports multiple devices in a single JTAG path
- includes 16-bit ISA-bus interface
- compatible with *UECM* and *UECM-30* daughter-card modules for *TORNADO* and with *MIRAGE-510D* and *MIRAGE-30D* emulators
- optional extended emulation compatibility with TI XDS510 emulator
- supported by TI HLL Debuggers and GoDSP Code Composer IDE

- target TMS320 DSP emulation features:
  - reads/writes to the DSP on-chip registers and I/O ports
  - provides access to the DSP on/off-chip memory, performs program/data upload and download
  - supports software/hardware breakpoints
  - supports program profiling and execution time measurement
  - signal graphics
  - file I/O
  - many more ...
- MPSD pod provides optional target TMS320C3x DSP RESET control for reliable emulation
- MPSD pod provides optional LED indicators for target TMS320C3x DSP chip POWER, CLOCK and RESET signals
- JTAG pod provides optional LED indicators for target DSP chip POWER and JTAG *TCK* and *TRST* signals
- MPSD and JTAG pods provide compatibility with all 3v/5v target TMS320 DSP
- many more ...

### General description

*UECMX* contains host ISA-bus interface and MPSD and JTAG scan-path emulation controller for scan-path emulation control of target TMS320 DSP.

*UECMX* should be installed as a daughter-card module onto *TORNADO* DSP system mainboard for ISA-bus host PC and onto *MIRAGE-510DX* emulator ISA-bus interface mainboard.

When installed onto *TORNADO* mainboard, *UECMX* can emulate either *TORNADO* on-board TMS320 DSP without pod or any external TI TMS320 DSP via optional MPSD or JTAG pod.

When installed onto *MIRAGE-510DX* mainboard, *UECMX* can emulate any TI TMS320 DSP via MPSD or JTAG pod. Up to two *UECMX* can be installed onto *MIRAGE-510DX* mainboard.

MPSD and JTAG pods for *UECMX* module are compatible with those for *MIRAGE-510D* and *MIRAGE-30D* scan-path emulators and connect to scan-path interface of target TMS320 DSP via interface headers, which are compatible with the corresponding headers for TI XDS510 scan-path emulator.

### Extended emulation compatibility

*UECMX* features 100% compatibility with the previous versions of MicroLAB Systems *UECM-30* and *UECM* daughter-card modules for *TORNADO* DSP systems and with *MIRAGE-510D* and *MIRAGE-30D* emulators. All software that runs on *UECM-30*, *UECM* and *MIRAGE-510D* and *MIRAGE-30D* will run well on *UECMX*.

However, *UECMX* also provides optional extended compatibility with TI XDS510 emulator, which allows to run all software for TI XDS510 emulator on *UECMX* as well. This feature might be useful for programming the TMS320 DSP on-chip FLASH memory, supporting the latest DSP silicon revisions, etc.

Switching between different emulation compatibility modes for *UECMX* is performed by means of utility software.

**Software development tools**

*UECMX* runs under the industry standard TI TMS320Cxx C Source Debuggers within DOS, Windows 3.x, Windows 95, Windows NT and OS/2 environments as well as under Go DSP Code Composer IDE under Windows 3.x, Windows 95 and Windows NT environments. All debuggers support debugging of target DSP software both in C and Assembly source codes.

Software development is supported by the corresponding TI Floating-Point or Fixed-Point DSP Optimizing C Compilers and Assembly Language Tools.

**1.2 Host PC requirements**

The following are minimum/recommended requirements that should be matched for normal operation of *UECMX* module and TI HLL Debuggers and Go DSP Code Composer IDE:

- either *TORNADO* DSP system for ISA-bus PC host with the corresponding header for installation of *UECMX* daughter-card module or *MIRAGE-510DX* emulator ISA-bus interface mainboard
- host PC with 80386 CPU (80486 or Pentium CPU are recommended) and at-least one 16-bit slot for installation of either *TORNADO* DSP system or *MIRAGE-510DX* emulator with *UECMX* daughter-card module installed
- 640KB RAM for DOS debuggers, 4 MB RAM (8 MB is recommended) for Windows 3.x debuggers, and 8MB (32 MB is recommended) for Windows 95/98/NT and OS/2 debuggers
- CD-ROM drive for software installation
- at least 4 MB of free hard disk space
- EGA/VGA adapter for DOS debuggers and SVGA for Windows and OS/2 debuggers
- Microsoft mouse
- MS-DOS v.3.3 (MS-DOS 6v..2 is recommended)
- Windows 3.x (Windows.11 is recommended), Windows 95/98 or Windows NT
- OS/2 rev.1.1 (OS/2 Warp is recommended)

**1.3 Technical specifications**

The following are technical specifications for *UECMX* and *MIRAGE-510DX* for the environment temperature +25°C.

<u>Parameter description</u>	<u>parameter value</u>
<i>UECMX</i> power consumption (without pod)	+5v@0.3A
dimensions of <i>UECMX</i> module	42x59 mm
dimensions of <i>MIRAGE-510DX</i> emulator mainboard	157x106 mm
number of sites for <i>UECMX</i> module on <i>MIRAGE-510DX</i> mainboard	2
<i>MIRAGE-510DX</i> host interface	16-bit ISA-bus

temperature range	0..+50°C
clock frequency for JTAG scan-path interface when <i>UECMX</i> is connected to the on-board DSP of <i>TORNADO</i> DSP system	software selectable as 20MHz, 10MHz (default) or 6.66MHz
emulation compatibility mode	software selectable as <i>UECM/MIRAGE-510D</i> (default) or T1 XDS510
<i>external MPSD and JTAG pods:</i>	
output high level with the load current $I_{OH}=48\text{ma}$ at all outputs	$\geq 2\text{v}$ , TTL 3v compatible
output low level with the load current $I_{OH}=48\text{ma}$ at all outputs	$\leq 0.5\text{v}$
input high level at all inputs	$\geq 2\text{v}$ , TTL 5v compatible
input low level at all inputs	$\leq 0.5\text{v}$
length of connection cable between pod and <i>UECMX</i>	$\geq 1\text{m}$
length of connection cable for connection to scan-path interface of target DSP	$\geq 0.1\text{m}$
JTAG and MPSD pod dimensions	89x57x25 mm

## Chapter 2. Construction

This chapter contains information about construction of *UECMX* module, *MIRAGE-510DX* emulator and MPSD and JTAG pods.

### 2.1 *UECMX* module and *MIRAGE-510DX* emulator

*UECMX* module (fig.2-1) is designed as a daughter-card module for *TORNADO* DSP system mainboard and *MIRAGE-510DX* emulator ISA-bus interface mainboard (fig.2-2).

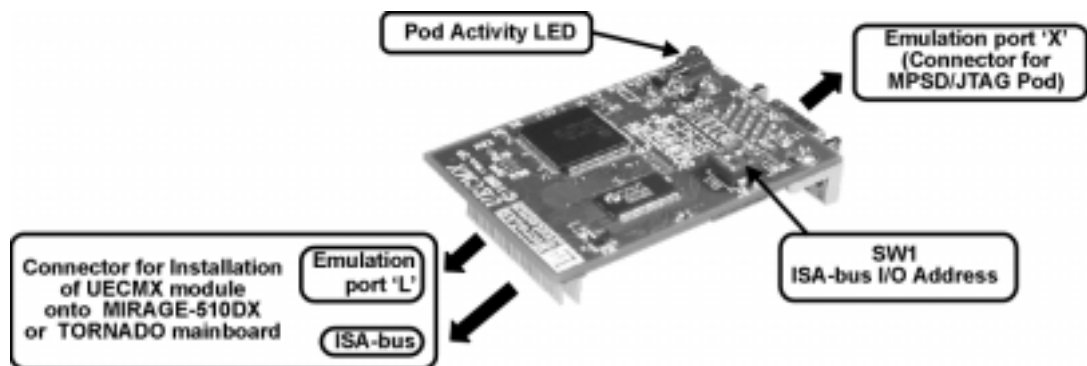


Fig.2-1. *UECMX* construction.

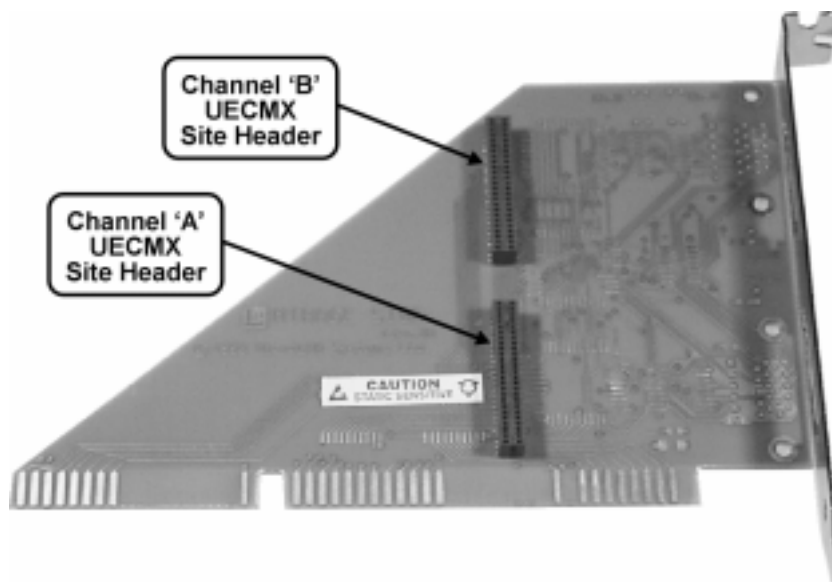


Fig.2-2. MIRAGE-510DX emulator ISA-bus interface mainboard.

#### CAUTION

Most of *TORNADO* DSP systems with ISA-bus host interface allow installation of *UECMX* daughter-card module. Check with your *TORNADO* board specification for *UECMX* module compatibility.

### UECMX Description

*UECMX* comprises of the following components:

- scan-path emulation controller for emulation control of target TMS320 DSP
- emulation ports 'T' and 'X'
- host ISA-bus interface.

Emulation controller of *UECMX* provides emulation control of target TMS320 DSP. All target TMS320 DSP with either MPSD or JTAG scan-path emulation interfaces are supported (refer to original TI documentation for details about scan-path emulation interface of your TMS320 DSP).

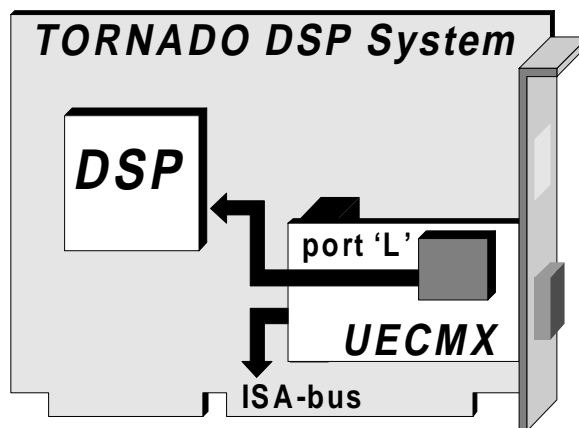
Emulation controller of *UECMX* connects to target TMS320 DSP via either of two on-board emulation ports known as ports 'L' (local) and 'X' (external).

Emulation port 'L' is used when *UECMX* module is installed onto *TORNADO* DSP system mainboard (see fig.1-2) and is configured for emulation control of *TORNADO* on-board TMS320 DSP (see fig.2-3). Emulation port 'L' of *UECMX* is directly connected to scan-path emulation interface of *TORNADO* on-board TMS320 DSP thus eliminating the need for external emulator with JTAG or MPSD pod.



**CAUTION**

Most of *TORNADO* DSP systems with ISA-bus host interface allow installation of *UECMX* daughter-card module. Check with your *TORNADO* board specification for *UECMX* module compatibility.



*Fig.2-3.* Emulation of *TORNADO* on-board DSP via emulation port 'L' of *UECMX*.

Emulation port 'X' is used when *UECMX* module is installed either onto *MIRAGE-510DX* emulator mainboard (see fig.1-3 and fig.2-4) or onto *TORNADO* DSP system mainboard (see fig.1-2 and fig.2-5) with the *UECMX* configured for emulation control of external TMS320 DSP. Emulation port 'X' of *UECMX* assumes connection to target TMS320 DSP via optional JTAG or MPSD pod (see the corresponding section below in this chapter for detail information about JTAG and MPSD pods).

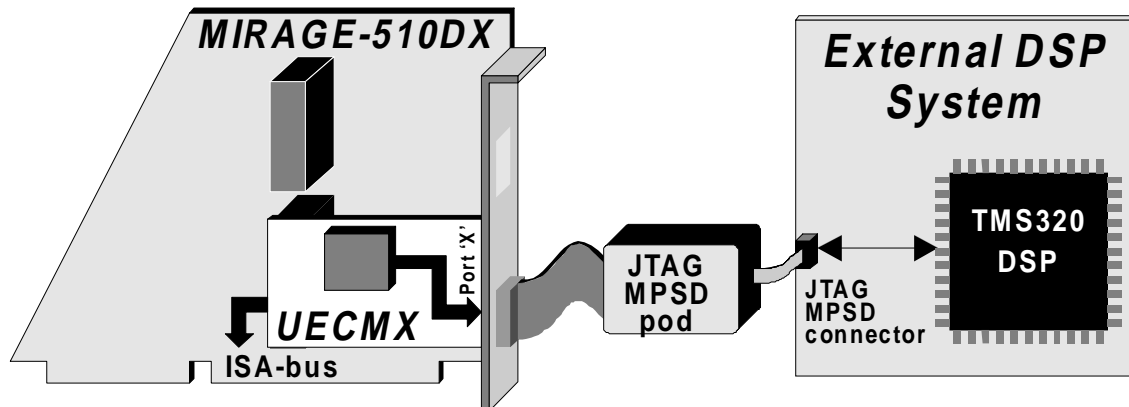


Fig.2-4. Emulation of external TMS320 DSP via emulation port 'X' of *UECMX* in case *UECMX* is installed onto *MIRAGE-510DX* mainboard.

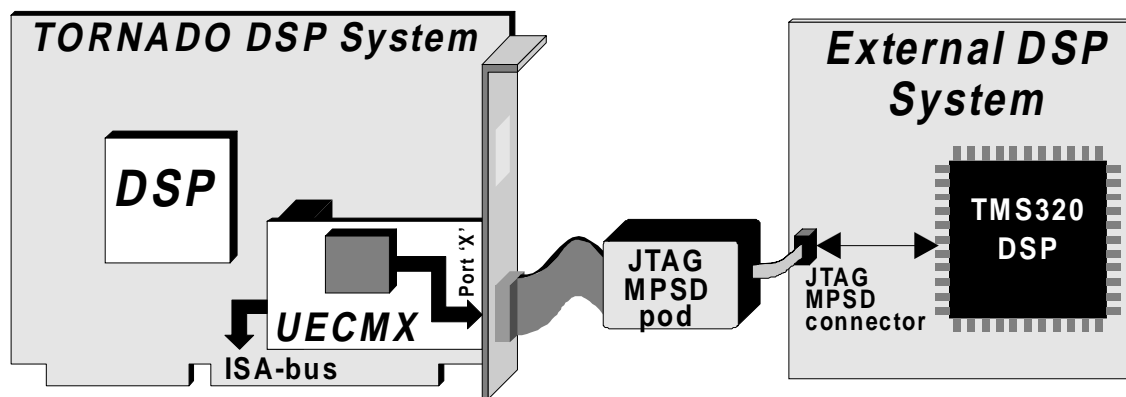


Fig.2-5. Emulation of external TMS320 DSP via emulation port 'X' of *UECMX* in case *UECMX* is installed onto *TORNADO DSP* system mainboard.

**IMPORTANT**

When *UECMX* is installed onto *TORNADO* DSP system mainboard, it can emulate the *TORNADO* on-board TMS320 DSP without MPSPD/JTAG pod requirement using emulation port 'L'.

When *UECMX* is installed onto *TORNADO* DSP system mainboard, it can optionally emulate any external TMS320 DSP via optional MPSPD or JTAG pod using emulation port 'X'.

When *UECMX* is installed onto *MIRAGE-510DX* emulator mainboard, it can emulate any external TMS320 DSP via JTAG or MPSPD pod using emulation port 'X' only.

*UECMX* contains 16-bit host ISA-bus interface which connects to ISA-bus of host PC when *UECMX* installs either onto *TORNADO* DSP system mainboard or onto *MIRAGE-510DX* emulator mainboard.

***MIRAGE-510DX emulator mainboard***

*MIRAGE-510DX* emulator mainboard (see fig.2-2) is designed to plug into 16-bit ISA-bus slot of host PC and contains two connectors for installation of two *UECMX* modules (sites 'A' and 'B') thus delivering two completely independent JTAG or MPSPD emulation channels for emulation of external TI TMS320 DSP.

***ISA-bus I/O base address for UECMX on-board emulation controller***

ISA-bus I/O base address for *UECMX* on-board emulation controller is set via the on-board dual-button DIP-switch SW1 (fig.2-1) in accordance with table 2-1.

Table 2-1. ISA-bus I/O base address settings for *UECMX*.

ISA-bus I/O base address	I/O address range	SW1-1 button	SW1-2 button
<i>0x240</i>	<i>0x240...0x25F</i>	ON	ON
<i>0x280</i>	<i>0x280...0x29F</i>	ON	OFF
<i>0x320</i>	<i>0x320...0x33F</i>	OFF	ON
<i>0x340</i>	<i>0x340...0x35F</i>	OFF	OFF

Note: The highlighted configuration corresponds to default factory setting.

### CAUTION

You have to set unique ISA-bus I/O base addresses for *UECMX* that should not conflict with ISA-bus I/O base addresses of another *UECMX* or other hardware installed into ISA-bus of your host PC.

## Emulation compatibility

*UECMX* can operate in two emulation compatibility modes:

- *UECM/MIRAGE-510D* emulation compatibility mode
- TI XDS510 emulation compatibility mode (default setting on host PC power on).

*UECMX* features 100% compatibility with the previous versions of MicroLAB Systems *UECM-30* and *UECM* daughter-card modules for *TORNADO* DSP systems and with *MIRAGE-510D* and *MIRAGE-30D* emulators. All software that runs on *UECM-30*, *UECM* and *MIRAGE-510D* and *MIRAGE-30D* will run well on *UECMX*.

However, *UECMX* also provides optional extended compatibility with TI XDS510 emulator, which allows to run all software for TI XDS510 emulator on *UECMX* as well. This feature might be useful for programming the TMS320 DSP on-chip FLASH memory, supporting the latest DSP silicon revisions, etc.

Switching between different emulation compatibility modes for *UECMX* is performed by means of utility software.

### CAUTION

The TI XDS510 compatibility mode for *UECMX* module and *MIRAGE-510DX* emulator is set as default on host PC power-on and after host PC hardware reset

## Using *UECMX* with *MIRAGE-510DX* emulator mainboard

When *UECMX* is installed onto *MIRAGE-510DX* emulator mainboard (see fig.1-3 and fig.2-4), it can emulate any external TMS320 DSP via JTAG or MPSD pod using on-board emulation port 'X' only. Emulation port 'L' is not used when *UECMX* is installed onto *MIRAGE-510DX* emulator mainboard.

Multichannel capability of *MIRAGE-510DX* is extremely useful in case target TMS320C3x DSP are being emulated, which support MPSD scan-path emulation interface and do not allow daisy-chaining in one scan-path. Note, that JTAG scan-path interface of target TMS320 DSP allow daisy-chaining of scan-path interfaces of multiple TMS320 DSP in one JTAG path thus delivering the multiprocessor debugging capability with only one JTAG path.

### **Controlling activity of emulation controller when *UECMX* is installed onto *MIRAGE-510DX* mainboard (*UECM/MIRAGE-510D* compatibility mode only)**

When *UECMX* is installed onto *MIRAGE-510DX* mainboard (see fig.1-3 and fig.2-4), and *UECMX* is configured to run in the *UECM/MIRAGE-510D* emulation compatibility mode, then host control over activity of *UECMX* on-board emulation controller is available via host utility software *UECMXCC.EXE*, which is included with *UECMX*.

Also, *UECMX* provides visual control of activity for on-board emulation controller via on-board LED indicator (see fig.2-1).

Valid activity of emulation controller means that the emulation controller is active within the ISA-bus I/O address space, which is defined by current settings of the corresponding on-board DIP-switch. Inactive emulation channel is disconnected from ISA-bus.

This allows to 'remove' currently unused *UECMX* emulation controller from ISA-bus I/O address space and to free up the corresponding I/O address space occupied by emulation controllers for other hardware boards installed into ISA-bus of host IBM PC.

#### **CAUTION**

On host PC power up and after the host PC reset, the activities of both *MIRAGE-510DX* emulation channels for *UECM/MIRAGE-510D* compatibility mode are switched off.

### **Using *UECMX* with *TORNADO* DSP system mainboard**

When installed onto *TORNADO* mainboard (see fig.1-2), *UECMX* can emulate either *TORNADO* on-board TMS320 DSP without pod (see fig.2-3) or any external TI TMS320 DSP via optional MPSD or JTAG pod (see fig.2-5).

Switching of *UECMX* on-board emulation controller between the *TORNADO* on-board TMS320 DSP and external target TI TMS320 DSP is performed by means of utility software *UECMXCC.EXE*, which is included with *UECMX*.

### **Emulation of *TORNADO* on-board DSP**

When *UECMX* is installed onto *TORNADO* mainboard (see fig.1-2) and is configured to connect to *TORNADO* on-board TMS320 DSP via *UECMX* on-board emulation port 'L' (see fig.2-3), then *TORNADO* on-board emulation multiplexer connects emulation port 'L' of *UECMX* module to scan-path interface of target *TORNADO* on-board TMS320 DSP, thus eliminating the need for external emulator with JTAG or MPSD pod.

This is a default configuration for *UECMX* installed onto *TORNADO* mainboard after host PC power on and reset conditions.

### **Clock frequency of JTAG path for TORNADO on-board TMS320 DSP**

When *UECMX* is installed onto *TORNADO* mainboard (see fig.1-2 and fig.2-3) and is configured to connect to *TORNADO* on-board TMS320 DSP, then 10 MHz default JTAG clocking frequency is used.

However, in case *TORNADO* on-board JTAG scan-path is too long and comprises of several *TORNADO* boards or user supplied TMS320 DSP based boards, it may be desired to reduce JTAG clock frequency to compensate JTAG delays occurred in this long JTAG path. To meet these requirements, *UECMX* can be configured to generate the reduced JTAG clock frequency as low as 6.66 MHz.

Also, in case *TORNADO* on-board JTAG scan-path contains high-performance TMS320 DSP with increased JTAG scan-path clock frequency, it may be desired to increase JTAG clock frequency to benefit from the higher performance of JTAG scan-path interface of *TORNADO* on-board DSP. To meet these requirements, *UECMX* can be configured to generate JTAG clock frequency as high as 20 MHz.

JTAG clock frequency selection for *TORNADO* on-board JTAG scan-path is performed by means of utility software *UECMXCC.EXE*, which is included into utility software for *UECMX* module.

### **Emulation of External TMS320 DSP when UECMX is installed onto TORNADO DSP system**

When *UECMX* is installed onto *TORNADO* DSP system mainboard (see fig.1-2) and is configured to emulate external TMS320 DSP (see fig.2-5), then this can be performed via optional MPSD or JTAG pod that should be connected to the emulation port 'X' of *UECMX* on one side and to target DSP on the other side. This is similar to that when *UECMX* is installed onto *MIRAGE-510DX* mainboard.

When *UECMX* is installed onto *TORNADO* DSP system mainboard and is configured to emulate external DSP via optional pod, then *TORNADO* on-board emulation multiplexer connects scan-path emulation interface of *TORNADO* on-board DSP to the on-board header for connection to external TI XDS510 or MicroLAB' *MIRAGE-510DX* emulator.

### **MPSD and JTAG pods**

MPSD and JTAG pods, which are used for connection of *UECMX* on-board emulation controller to external TI TMS320 DSP via on-board emulation port 'X' in the following cases:

- *UECMX* is installed onto *TORNADO* DSP system mainboard (see fig.1-2 and fig.2-5) and is configured to emulate external DSP
- *UECMX* is installed onto *MIRAGE-510DX* mainboard (see fig.1-3 and fig.2-4).

MPSD and JTAG pods used with *UECMX* are the same pods, which have been used with *UECM-30* and *UECM* daughter-card modules for *TORNADO* DSP systems and with *MIRAGE-510D* and *MIRAGE-30D*

dual-channel emulators from MicroLAB Systems. Both MPD and JTAG pods provide compatibility with all 3v/5v target TMS320 DSP.

MPD pod is used for emulation of external TMS320C3x DSP only. MPD pod is connected to target TMS320C3x DSP via user supplied 12-pin male header that is compatible with that for TI XSD510 emulator.

JTAG pod is used for emulation of external TMS320C2xx/C4x/C5x/C54x/C6x/C8x DSP. JTAG pod is connected to target TMS320 DSP via user supplied 14-pin male header that is compatible with that for TI XSD510 emulator.

## 2.2 MPD pod

MPD pod (fig.2-6) is designed for connection between *UECMX* emulation port 'X' and scan-path interface of external target TMS320C3x DSP only.



Fig.2-6. MPD pod.

### CAUTION

No other TMS320 DSP except for TMS320C3x (TMS320C30/C31/C32) DSP allow connection of MPD pod to DSP on-chip MPD scan-path emulation interface.

MPD pod is used when *UECMX* is either *UECMX* is installed onto *MIRAGE-510DX* mainboard (see fig.1-3 and fig.2-4) or when *UECMX* is installed onto *TORNADO* DSP system mainboard (see fig.1-2 and fig.2-5) and is configured to emulate external DSP.

### Connection of MPD pod to UECMX

MPD pod connects to emulation port 'X' connector of *UECMX* module via the 20-pin connector at the end of the pod's shielded cable via the rear bracket of either *TORNADO* DSP system mainboard or of *MIRAGE-510DX* mainboard, whichever is installed into host PC.

### Connection of MPD pod to scan-path interface of target TMS320C3x DSP

MPSD pod connects to scan-path emulation interface of target TMS320C3x DSP via 12-pin dual-row male header, which should be provided on the target TMS320C3x DSP based equipment and should be compatible with that for connection of TI XDS510 scan-path emulator. Scan-path signals specifications are identical to those for TI XDS510 scan-path emulator. MPSD pod provides compatibility with all 3v/5v target TMS320C3x DSP.

Fig. 2-7 specifies pinout of the MPSD 12-pin male header for target TMS320C3x DSP based equipment for connection to MPSD pod.

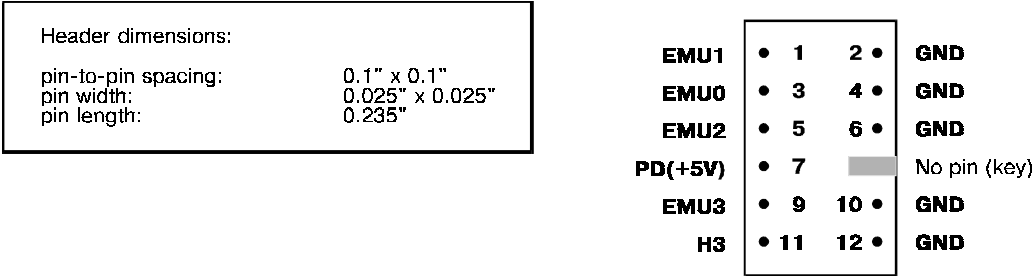


Fig.2-7. Pinout of male header for attachment of MPSD pod to scan-path emulation interface of target TMS320C3x DSP (top view).

For more information about MPSD scan-path emulation interface signals of TMS320C3x DSP refer to original technical documentation from TI.

**RESET signal control for target TMS320C3x DSP**

MPSD pod provides optional facility for remote control of RESET signal for target TMS320C3x DSP chip. This has approved to increase reliability of scan-path emulation control of target TMS320C3x DSP chip.

CAUTION

MPSD pod supports generation of RESET signal for target TMS320C3x DSP only in case UECMX operates in the UECM/MIRAGE-510D emulation compatibility mode.

MPSD pod provides 2-pin female connector (see fig.2-6) that includes two reset signals of opposite polarities (*RESET* and *RESET*), which might be connected to the target TMS320C3x DSP hardware in order to provide control of target TMS320C3x DSP reset signal.



**CAUTION**

MPSD pod generates target TMS320C3x DSP reset signal of opposite polarities (*RESET* and  $\overline{RESET}$ ).

Actual selection of target DSP RESET signal polarity should be done by user in accordance with schematics of target hardware.

*RESET* and  $\overline{RESET}$  outputs of MPSD pod provide the load current 48 ma for both high and low output 3v/5v TTL compatible signal levels.

**Indication of target TMS320C3x DSP status**

For user convenience, MPSD pod provides LED indicators for the following signals:

- 'ACTIVE' LED indicates activity of MPSD pod and of emulation port 'X' of *UECMX*.
- 'T-POWER' LED indicates validity of target TMS320C3x power supply. In case the 'T-POWER' LED has continuous green lighting, then the power is applied to target DSP. In case this LED blinks, then no power is applied to target DSP.
- 'T-CLOCK' LED indicates validity of target H3 output clock. When H3 target clock is absent or not connected to MPSD pod interface header, then no scan-path emulation control of target TMS320C3x DSP chip is available.
- 'T-RESET' LED indicates activity of optional target RESET signal generated by emulation controller of *UECMX*.

**2.3 JTAG pod**

JTAG pod (fig.2-7) is designed for connection between *UECMX* emulation port 'X' and scan-path interfaces of external target TMS320 DSP with JTAG scan-path emulation interface (TMS320C2xx/C4x/C5x/C54x/C6x/C8x).



Fig.2-7. JTAG pod.

**CAUTION**

No other TMS320 DSP except for TMS320 DSP with on-chip JTAG scan-path emulation interface allow connection of JTAG pod to DSP on-chip JTAG scan-path emulation interface.

JTAG pod is used when *UECMX* is either *UECMX* is installed onto *MIRAGE-510DX* mainboard (see fig.1-3 and fig.2-4) or when *UECMX* is installed onto *TORNADO* DSP system mainboard (see fig.1-2 and fig.2-5) and is configured to emulate external DSP.

**Connection of JTAG pod to UECMX**

JTAG pod connects to emulation port 'X' connector of *UECMX* module via the 20-pin connector at the end of the pod's shielded cable via the rear bracket of either *TORNADO* DSP system mainboard or of *MIRAGE-510DX* mainboard, whichever is installed into host PC.

**Connection of JTAG pod to scan-path interface of target TMS320 DSP**

JTAG pod connects to scan-path emulation interface of target TMS320 DSP via 14-pin dual-row male header, which should be provided on the target TMS320 DSP based equipment and should be compatible with that for connection of TI XDS510 scan-path emulator. Scan-path signals specifications are identical to those for TI XDS510 scan-path emulator. JTAG pod provides compatibility with all 3v/5v target TMS320 DSP.

Fig. 2-8 specifies pinout of the JTAG 14-pin male header for target TMS320 DSP based equipment for connection to JTAG pod.

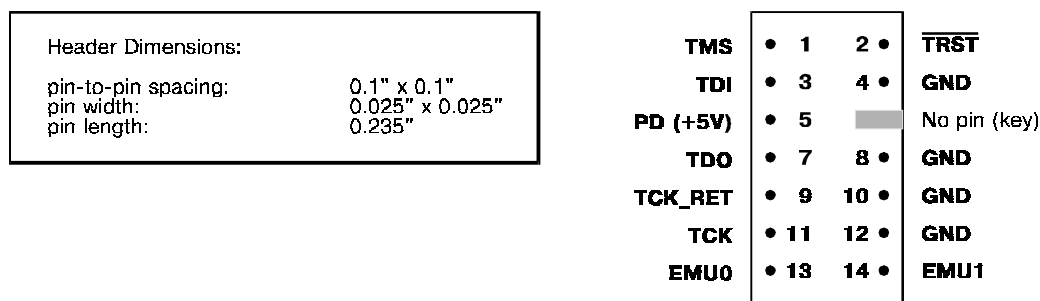


Fig.2-8. Pinout of male header for connection of JTAG pod to scan-path emulation interface of target TMS320 DSP (top view).

For more information about JTAG scan-path emulation interface signals of TMS320 DSP refer to original technical documentation from TI.

**Setting terminators for TDO and TCK\_RET JTAG signals**

JTAG pod provides optional facility for setting 220/270 Ohm parallel resistor terminators for *TDO* and *TCK\_RET* JTAG scan-path signals. This delivers noise reduction and increase reliability of JTAG operation, however this requires high-current output drivers in the target hardware, and might be not applicable for all designs. To get more information about signal terminators for *TDO* and *TCK\_RET* JTAG signals refer to section "*XDS510 Emulator Design Considerations*" of the corresponding TI TMS320 User's Guide.

In order to set terminators for *TDO* and *TCK\_RET* JTAG signals you have to use buttons #3 and #4 of DIP-switch, which is located at the bottom of JTAG pod.

**Table 2-2.** Setting resistor terminators for *TDO* and *TCK\_RET* JTAG signals in JTAG pod.

Number of button of DIP-switch in JTAG pod	state of the button	description
button #4	OFF	resistor terminator 220/270 Ohm for signal <i>TDO</i> is off
	ON	resistor terminator 220/270 Ohm for signal <i>TDO</i> is on
button #3	OFF	resistor terminator 220/270 Ohm for signal <i>TCK_RET</i> is off
	ON	resistor terminator 220/270 Ohm for signal <i>TCK_RET</i> is on

*Notes:* The highlighted configurations correspond to default factory settings.

### Setting active edge of *TCK\_RET* clock signal for clocking *TMS* and *TDI* JTAG signals

JTAG pod provides optional facility for setting active edge of *TCK\_RET* clock signal that is used for clocking *TMS* and *TDI* JTAG scan-path signals. This facility allows to increase clocking frequency of JTAG path and increase its performance. To get more information about clocking of *TMS* and *TDI* JTAG signals refer to section "*XDS510 Emulator Design Considerations*" from the corresponding TI TMS320 User's Guide.

#### CAUTION

JTAG pod supports setting different active edges of *TCK\_RET* clock signal for clocking *TMS* and *TDI* JTAG signals only in case *UECMX* is configured for *UECM/MIRAGE-510D* emulation compatibility mode.

If *UECMX* is configured for TI XDS510 emulation compatibility mode, then the active edge of *TCK\_RET* clock signal for clocking *TMS* and *TDI* JTAG signals should be set only in accordance with table 2-3.

In order to set active edge of *TCK\_RET* clock signal for clocking *TMS* and *TDI* JTAG signals you have to use buttons #1 and #2 of DIP-switch, which is located at the bottom of JTAG pod.

Table 2-3. Setting active edge of *TCK\_RET* clock for clocking *TMS* and *TDI* JTAG signals in JTAG pod.

Button #1 of DIP-switch in JTAG pod	button #2 of DIP-switch in JTAG pod	description
OFF	OFF	Reserved (do not use)
OFF	ON	Rising edge of <i>TCK_RET</i> is used to clock <i>TMS</i> and <i>TDI</i> signals.  This configuration should be set when <i>UECMX</i> is configured for TI XDS510 emulation compatibility mode.
ON	OFF	Falling edge of <i>TCK_RET</i> is used to clock <i>TMS</i> and <i>TDI</i> signals.
ON	ON	Reserved (do not use)

Notes: The highlighted configuration corresponds to the factory settings.

### Indication of target DSP status

For user convenience, JTAG pod includes LED indicators for the following signals:

- 'ACTIVE' LED indicates activity of MPSD pod and of emulation port 'X' of *UECMX*.
- 'T-POWER' LED indicates validity of target DSP power supply. In case 'T-POWER' LED has continuous green lighting, then the power is applied to target DSP. In case this LED blinks, then no power is applied to target DSP.
- 'TCK\_RET' LED indicates validity of JTAG path clock. When JTAG return path clock is absent or not returned back to JTAG pod interface header, then no scan-path emulation control of target DSP is available.
- 'TRST' LED indicates activity of JTAG path RESET signal generated by emulation controller of *UECMX* module.

## Chapter 3. Installation

This chapter contains instructions for installation of *UECMX* module onto *TORNADO* and *MIRAGE-510DX* mainboards and how to connect *UECMX* module to target TMS320 DSP.

### 3.1 Installation of *UECMX* module onto *MIRAGE-510DX* mainboard

*UECMX* module installs into either of two on-board connector sites (channels 'A' and 'B') onto *MIRAGE-510DX* mainboard (see fig.2-2). One or two *UECMX* modules can be installed onto *MIRAGE-510DX* mainboard. Figure 3-1 demonstrates installation of *UECMX* module onto *MIRAGE-510DX* mainboard.

In order to install *UECMX* module onto *MIRAGE-510DX* mainboard you have to follow the instructions below:

- slant *UECMX* module
- insert *UECMX* on-module connector for pod (emulation port 'X')) into the corresponding hole of *MIRAGE-510DX* mounting bracket
- plug in *UECMX* male header into the dedicated female connector site on *MIRAGE-510DX* mainboard
- set ISA-bus I/O base address for *UECMX* module using on-board DIP-switch (see fig.2-1 and table 2-1).

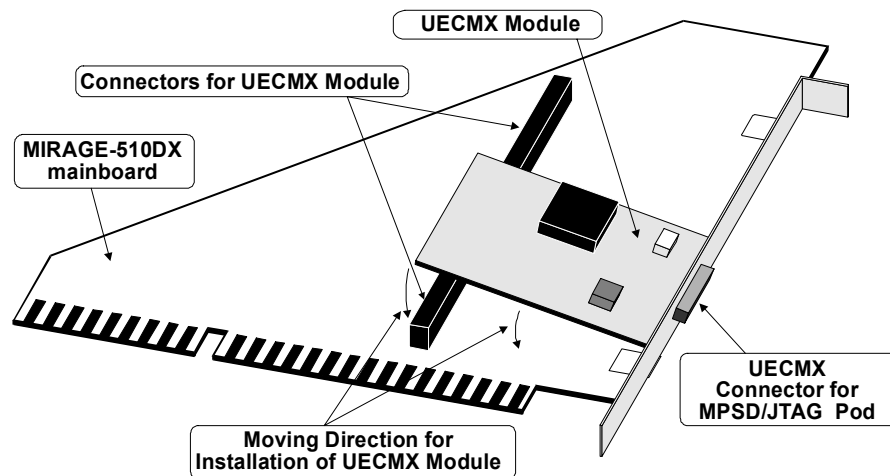


Fig.3-1. Installation of *UECMX* module onto *MIRAGE-510DX* mainboard.

**CAUTION**

You have to set ISA-bus I/O base addresses for *UECMX* that should not conflict with ISA-bus I/O base address of another *UECMX* module or other hardware installed into ISA-bus of host PC.

## 3.2 Installation of *UECMX* module onto *TORNADO* DSP system mainboard

*UECMX* module installs into the dedicated on-board connector site onto *TORNADO* DSP system mainboard (see fig.2-3 and fig.3-2).

In order to install *UECMX* module onto *TORNADO* DSP system mainboard you have to follow the instructions below:

- slant *UECMX* module
- insert *UECMX* on-module connector for pod (emulation port 'X') into the corresponding hole of *TORNADO* DSP system mounting bracket
- plug in *UECMX* male header into the dedicated female connector site on *TORNADO* mainboard
- set ISA-bus I/O base address for *UECMX* module using on-board DIP-switch (see fig.2-1 and table 2-1).

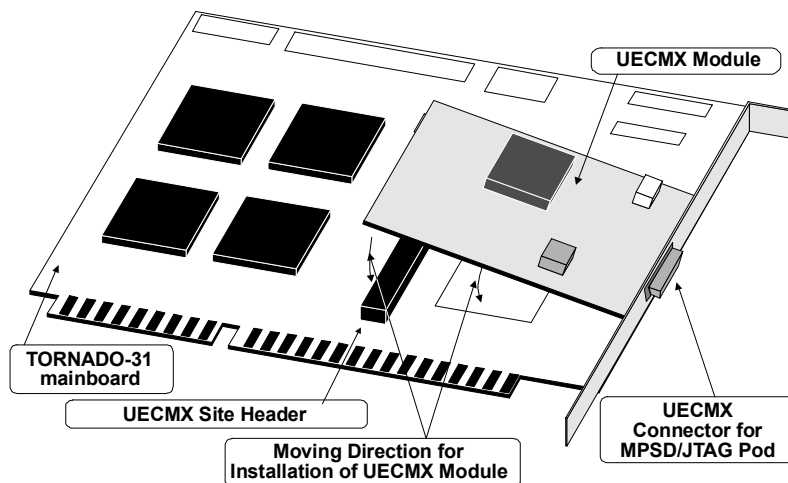


Fig.3-2. Installation of *UECMX* module onto *TORNADO*-31 mainboard.

**CAUTION**

You have to set ISA-bus I/O base addresses for *UECMX* that should not conflict with ISA-bus I/O base address of another *UECMX* module or other hardware installed into ISA-bus of host PC.

### 3.3 Setting *UECMX* emulation compatibility mode

It is possible to set emulation compatibility mode for *UECMX* module when *UECMX* is installed onto *TORNADO* mainboard and when *UECMX* is installed onto *MIRAGE-510DX* mainboard.

**CAUTION**

The TI XDS510 compatibility mode for *UECMX* module and *MIRAGE-510DX* emulator is set as default on host PC power-on and after host PC hardware reset

Emulation compatibility mode for *UECMX* module (see section 2.1) might be configured by the software utility *UECMXCC.EXE*, which is included with *UECMX* module or *MIRAGE-510DX* emulator.

#### Setting *UECM/MIRAGE-510D* emulation compatibility mode

In order to configure *UECMX* module to run in the *UECM/MIRAGE-510D* emulation compatibility mode, the *UECMXCC.EXE* software utility should be invoked with the *-m0* command line option. The following is example for invoking the *UECMXCC.EXE* software utility in order to set the *UECM/MIRAGE-510D* emulation compatibility mode:

```
UECMXCC -m0
```

#### Setting *TI XDS510* emulation compatibility mode

In order to configure *UECMX* module to run in the *TI XDS510* emulation compatibility mode, the *UECMXCC.EXE* software utility should be invoked with the *-m1* command line option. The following is example for invoking the *UECMXCC.EXE* software utility in order to set the *TI XDS510* emulation compatibility mode:

```
UECMXCC -m1
```

Note also, that the *TI XDS510* compatibility mode for *UECMX* module is set as default on host PC power on and after host PC hardware reset.

#### Specifying ISA-bus I/O base Address for *UECMX*

In case ISA-bus I/O base address for *UECMX* module differs from the default factory setting (see table 2-1), then you have to specify *-p* command line option for *UECMXCC.EXE* software utility:

*UECMXCC -m0 -pXXX*

*UECMXCC -m1 -pXXX*

For example:

*UECMXCC -m0 -p280*

*UECMXCC -m1 -p280*

Parameter specified with *-p* command line option should define hex I/O base address for the *UECMX* module in accordance with table 2-1.

Note, that *UECMXCC.EXE* software utility also recognizes the *-p* parameter from parameter list of *D\_OPTIONS* DOS system environment variable, which is used with TI C Source Debuggers for *UECMX* in order to specify default command line options when invoking debugger. The *D\_OPTIONS* DOS environment variable can be set using DOS *SET* command:

*SET D\_OPTIONS=-p280*

However, the *-p* command line option for *UECMXCC.EXE* overrides setting of ISA-bus I/O base address for *UECMX* module, which is specified by *-p* parameter with *D\_OPTIONS* DOS system environment variable.

### **3.4 Setting target emulation port for *UECMX* (configuring *UECMX* to emulate either *TORNADO* on-board DSP or external TMS320 DSP)**

When *UECMX* is installed onto *TORNADO* mainboard, it can be configured to emulate either the *TORNADO* on-board TMS320 DSP without external pod requirement via emulation port 'L' (fig.2-3), or any external TI TMS320 DSP via optional MPSD or JTAG pod (see fig.2-5), which is connected to the emulation port 'X' of *UECMX*.

In order to configure *UECMX* module to connect to the particular emulation port, the software utility *UECMXCC.EXE* should be used, which is included with *UECMX* module or *MIRAGE-510DX* emulator.

#### **Selecting emulation port 'L' (configuring *UECMX* for emulation of *TORNADO* on-board DSP)**

In order to configure *UECMX* to connect to *TORNADO* on-board TMS320 DSP via emulation port 'L' of *UECMX* and without any external JTAG or MPSD pod requirement, the *UECMXCC.EXE* software utility should be invoked with the *-ei* command line option. The following is example for invoking the *UECMXCC.EXE* software utility in order to select the emulation port 'L':

*UECMXCC -ei*

Once the *-ei* command line option is executed, the *UECMX* on-board "EXT POD" LED indicator will be switched off.

#### **Selecting emulation port 'X' (configuring *UECMX* for emulation of any external TMS320 DSP)**



In order to configure *UECMX* to connect to any external TMS320 DSP via emulation port 'L' of *UECMX* and via optional JTAG or MPSD pod, the *UECMXCC.EXE* software utility should be invoked with the *-ex* command line option. The following is example for invoking the *UECMXCC.EXE* software utility in order to select the emulation port 'X':

*UECMXCC -ex*

Once the *-ex* command line option is executed, the *UECMX* on-board "EXT POD" LED indicator and "ACTIVE" LED indicator on connected MPSD or JTAG pod will be both switched on.

### **Setting ISA-bus I/O Base Address for UECMX**

In case ISA-bus I/O base address for *UECMX* module differs from the default factory setting (see table 2-1), then you have to specify *-p* command line option for *UECMXCC.EXE* software utility:

*UECMXCC -ei -pXXX*

*UECMXCC -ex -pXXX*

For example:

*UECMXCC -ei -p280*

*UECMXCC -ex -p280*

Parameter specified with *-p* command line option should define hex I/O base address for the *UECMX* module in accordance with table 2-1.

Note, that *UECMXCC.EXE* software utility also recognizes the *-p* parameter from parameter list of *D\_OPTIONS* DOS system environment variable, which is used with TI C Source Debuggers for *UECMX* in order to specify default command line options when invoking debugger. The *D\_OPTIONS* DOS environment variable can be set using DOS *SET* command:

*SET D\_OPTIONS=-p280*

However, the *-p* command line option for *UECMXCC.EXE* overrides setting of ISA-bus I/O base address for *UECMX* module, which is specified by *-p* parameter with *D\_OPTIONS* DOS system environment variable.

## **3.5 Setting activity of *MIRAGE-510DX* emulation channels**

When *UECMX* is installed onto *MIRAGE-510DX* mainboard, and in case *UECMX* is configured to run in the *UECM/MIRAGE-510D* emulation compatibility mode, then host control over activity of *UECMX* on-board emulation controller (see section 2.1) is available via host utility software *UECMXCC.EXE*, which is included with *UECMX* and *MIRAGE-510DX*.

**CAUTION**

As default on host PC power up and after the host PC reset, the activities of both *MIRAGE-510DX* emulation channels are switched off for *UECM/MIRAGE-510D* compatibility mode.

**Setting MIRAGE-510DX emulation channel to the ACTIVE state**

In order to set the *UECMX* emulation controller to the ACTIVE state (when *UECMX* is installed onto *MIRAGE-510DX* mainboard, and in case *UECMX* is configured to run in the *UECM/MIRAGE-510D* emulation compatibility mode), the *UECMXCC.EXE* software utility should be invoked with the *-on* command line option:

*UECMXCC -on*

Once the *-on* command line option is executed, *UECMX* on-board "EXT POD" LED indicator and "ACTIVE" LED indicator on connected MPSD or JTAG pod will be both switched on. Valid activity of *UECMX* on-board emulation controller will activate the ISA-bus I/O address space, which is defined by current settings of the corresponding on-board DIP-switch.

**Setting MIRAGE-510DX emulation channel to INACTIVE state**

In order to set the *UECMX* emulation controller to INACTIVE state (when *UECMX* is installed onto *MIRAGE-510DX* mainboard, and in case *UECMX* is configured to run in the *UECM/MIRAGE-510D* emulation compatibility mode), the *UECMXCC.EXE* software utility should be invoked with the *-off* command line option:

*UECMXCC -off*

Once the *-off* command line option is executed, *UECMX* on-board "EXT POD" LED indicator and "ACTIVE" LED indicator on connected MPSD or JTAG pod will be both switched off. Invalid activity of *UECMX* on-board emulation controller will be switched off from the ISA-bus I/O address space thus freeing up this are for other I/O peripherals.

**Specifying ISA-bus I/O base Address for UECMX**

In case ISA-bus I/O base address for *UECMX* module differs from the default factory setting (see table 2-1), then you have to specify *-p* command line option for *UECMXCC.EXE* software utility:

*UECMXCC -on -pXXX*

*UECMXCC -off -pXXX*

For example:

*UECMXCC -on -p280*

*UECMXCC -off -p280*

Parameter specified with *-p* command line option should define hex I/O base address for the *UECMX* module in accordance with table 2-1.

Note, that *UECMXCC.EXE* software utility also recognizes the *-p* parameter from parameter list of *D\_OPTIONS* DOS system environment variable, which is used with TI C Source Debuggers for *UECMX* in order to specify default command line options when invoking debugger. The *D\_OPTIONS* DOS environment variable can be set using DOS *SET* command:

```
SET D_OPTIONS=-p280
```

However, the *-p* command line option for *UECMXCC.EXE* overrides setting of ISA-bus I/O base address for *UECMX* module, which is specified by *-p* parameter with *D\_OPTIONS* DOS system environment variable.

### 3.6 Setting JTAG clock frequency for emulation port 'L' of *UECMX* (when *UECMX* module is installed onto *TORNADO* mainboard)

When *UECMX* is installed onto *TORNADO* mainboard (with DSP with JTAG scan-path emulation interface only), and in case *UECMX* is configured to emulate *TORNADO* on-board TMS320 DSP without external pod requirement via emulation port 'L' (fig.2-3), different JTAG clock frequencies might be selected for the *TORNADO* on-board JTAG path (refer to section 2.1) using *UECMXCC.EXE* software utility, which is included with *UECMX* module or *MIRAGE-510DX* emulator.

#### CAUTION

As default on host PC power up and after the host PC reset, the JTAG clock frequency for emulation port 'L' of *UECMX* is set to the 10 MHz standard value.

#### Setting default 10 MHz JTAG clock frequency for emulation port 'L' of *UECMX*

In order to set JTAG clock frequency to 10 MHz for emulation port 'L' of *UECMX* (when *UECMX* is installed onto *TORNADO* DSP system mainboard, and in case *UECMX* is configured to emulate the *TORNADO* on-board TMS320 DSP via emulation port 'L'), the *UECMXCC.EXE* software utility should be invoked with the *-jcs* command line option:

```
UECMXCC -jcs
```

The 10 MHz clock frequency is standard frequency for JTAG scan-path emulation interface for all TI TMS320 DSP and should be used as default in case no specific JTAG clock frequency values are specified for *TORNADO* on-board TMS320 DSP.

#### Setting low 6.6 MHz JTAG clock frequency for emulation port 'L' of *UECMX*

In order to set JTAG clock frequency to 6.6 MHz for emulation port 'L' of *UECMX* (when *UECMX* is installed onto *TORNADO* DSP system mainboard, and in case *UECMX* is configured to emulate the *TORNADO* on-board TMS320 DSP via emulation port 'L'), the *UECMXCC.EXE* software utility should be invoked with the *-jcl* command line option:

*UECMXCC -jcl*

The 6.66 MHz clock frequency is low frequency for JTAG scan-path emulation interface of TI TMS320 DSP, and should be used in case *TORNADO* on-board JTAG scan-path is too long and comprises of several *TORNADO* boards or user supplied TMS320 DSP based boards.

**Setting high 20 MHz JTAG clock frequency for emulation port 'L' of UECMX**

In order to set JTAG clock frequency to 20 MHz for emulation port 'L' of *UECMX* (when *UECMX* is installed onto *TORNADO* DSP system mainboard, and in case *UECMX* is configured to emulate the *TORNADO* on-board TMS320 DSP via emulation port 'L'), the *UECMXCC.EXE* software utility should be invoked with the *-jch* command line option:

*UECMXCC -jch*

The 20 MHz clock frequency is high frequency for JTAG scan-path emulation interface of TI TMS320 DSP, and should be used only in case the *TORNADO* on-board JTAG scan-path contains high-performance TMS320 DSP with increased JTAG scan-path clock frequency and when particular *TORNADO* board specifications allow this settings.

**Specifying ISA-bus I/O base Address for UECMX**

In case ISA-bus I/O base address for *UECMX* module differs from the default factory setting (see table 2-1), then you have to specify *-p* command line option for *UECMXCC.EXE* software utility:

*UECMXCC -jcl -pXXX**UECMXCC -jcs -pXXX**UECMXCC -jch -pXXX*

For example:

*UECMXCC -jcl -p280**UECMXCC -jcs -p280**UECMXCC -jch -p280*

Parameter specified with *-p* command line option should define hex I/O base address for the *UECMX* module in accordance with table 2-1.

Note, that *UECMXCC.EXE* software utility also recognizes the *-p* parameter from parameter list of *D\_OPTIONS* DOS system environment variable, which is used with TI C Source Debuggers for *UECMX* in order to specify default command line options when invoking debugger. The *D\_OPTIONS* DOS environment variable can be set using DOS *SET* command:

*SET D\_OPTIONS=-p280*

However, the *-p* command line option for *UECMXCC.EXE* overrides setting of ISA-bus I/O base address for *UECMX* module, which is specified by *-p* parameter with *D\_OPTIONS* DOS system environment variable.

## 3.7 Resetting the *UECMX* module

It is required to provide hardware and software reset of *UECMX* module before running the TI HLL Debuggers and GoDSP Code Composer IDE, or after any trouble with target JTAG/MPSD scan-path. This enhances reliability of debugger software operation.

### *Hardware reset of UECMX*

Hardware reset for *UECMX* module is performed as default on host PC power-on or after host PC reset. It is also recommended to perform hardware reset of *UECMX* module in case of any trouble with target JTAG/MPSD scan-path.

Hardware reset of *UECMX* module activates the *TRST* signal from target *JTAG* path and optional *T-RESET* signal for *MPSD* pod, thus switching off JTAG scan-path interface of target DSP and optionally resetting target TMS320C3x DSP (in case optional *T-RESET* output signal of *MPSD* pod is used for reset control of target DSP).

Hardware reset for *UECMX* module is performed by the *-r* command line option of *UECMXCC.EXE* software utility, which is included with the *UECMX* module:

```
UECMXCC -r
```

### *Software reset of UECMX in TI XDS510 compatibility mode*

When *UECMX* module is running in the TI XDS510 emulator compatibility mode, it is required to perform software reset of *UECMX* module after host PC power on prior running TI HLL Debuggers and GoDSP Code Composer IDE, and in case of any trouble with target JTAG/MPSD scan-path. Although hardware reset of *UECMX* module overrides the reset function of software reset, however the software reset also preconfigures the *UECMX* module for correct operation with TI HLL Debuggers or GoDSP Code Composer IDE.

Software reset of *UECMX* module is performed by TI *EMURST.EXE* software utility, which is part of TI XDS510 emulator software and is also included with *UECMX* module:

```
EMURST  
EMURSTNT
```

### *Setting ISA-bus I/O Base Address for UECMX*

In case ISA-bus I/O base address for *UECMX* module differs from the default factory setting (see table 2-1), then you have to specify *-p* command line option for *UECMXCC.EXE* and *EMURST.EXE* software utilities:

```
UECMXCC -r -pXXX  
EMURST -p XXX  
EMURSTNT -p XXX
```

For example:

```
UECMXCC -r -p280  
EMURST -p XXX
```

*EMURSTNT -p XXX*

Parameter specified with *-p* command line option should define hex I/O base address for the *UECMX* module in accordance with table 2-1.

Note, that the *UECMXCC.EXE* and *EMURST.EXE* software utilities also recognize the *-p* parameter from parameter list of *D\_OPTIONS* DOS system environment variable, which is used with TI C Source Debuggers for *UECMX* in order to specify default command line options when invoking debugger. The *D\_OPTIONS* DOS environment variable can be set using DOS *SET* command:

*SET D\_OPTIONS=-p280*

However, the *-p* command line option for *UECMXCC.EXE* and *EMURST.EXE* overrides setting of ISA-bus I/O base address for *UECMX* module, which is specified by *-p* parameter with *D\_OPTIONS* DOS system environment variable.

## Chapter 4. *UECMXCC.EXE Software Utility*

Utility software for *UECMX* module and *MIRAGE-510DX* emulator includes *UECMXCC.EXE* (*UECMX* Control Center) utility program for DOS, which provides software control over *UECMX* hardware and configures *UECMX* for operation in all available modes.

*UECMXCC.EXE* utility is designed to be invoked from DOS prompt with command line options:

*UECMXCC* [-option1] [-option2] [-option3] ...

The following are valid command line options for *UECMXCC.EXE* utility:

- on
Enable emulation channel of *MIRAGE-510DX* emulator. This options is valid only in case *UECMX* is installed onto *MIRAGE-510DX* mainboard, and *UECMX* is configured to run in the *UECM/MIRAGE-510D* emulation compatibility mode. This option should be used prior invocation of software debuggers.
- off
Disable emulation channel of *MIRAGE-510D* emulator. This options is valid only in case *UECMX* is installed onto *MIRAGE-510DX* mainboard, and *UECMX* is configured to run in the *UECM/MIRAGE-510D* emulation compatibility mode. Inactive on-board emulation channel is completely disconnected from the corresponding ISA-bus I/O address space. Once emulation channel activity is disabled, no software debuggers for this emulation channel can be invoked. This option is set as default after power on or after PC reset button is released.
- ei
Select emulation port 'L' of *UECMX*, i.e. configure *UECMX* to emulate *TORNADO* on-board TMS320 DSP. This option is valid only in case *UECMX* is installed onto *TORNADO* mainboard. This option is set as default after power on or after PC reset button is released.
- ex
Select emulation port 'X' of *UECMX*, i.e. configure *UECMX* to emulate any external TMS320 DSP via optional MPSD or JTAG pod. This option is valid only in case *UECMX* is installed onto *TORNADO* mainboard.
- r
Perform hardware reset of *UECMX*. The *TRST* signal from *JTAG* path and *T-RESET* signal for *MPSD* pod will be set up to active state. Scan-path interfaces of target DSP will be switched off. This option is recommended prior running of software debuggers in order to reset *JTAG/MPSD* scan-path interface of target DSP.
- m0
Enable *UECM/MIRAGE-510D* emulation compatibility mode for *UECMX*.
- m1
Enable TI XDS510 emulation compatibility mode for *UECMX*. This option is set as default after power on or after PC reset button is released.
- jcs
Set default 10 MHz *JTAG* clock frequency for emulation port 'L' of *UECMX*. This option is valid only in case *UECMX* is installed onto *TORNADO* mainboard and is configured to emulate *TORNADO* on-

- board DSP. This option is set as default after power on or after PC reset button is released.
- jcl Set low 6.6 MHz JTAG clock frequency for emulation port ‘L’ of *UECMX*. This option is valid only in case *UECMX* is installed onto *TORNADO* mainboard and is configured to emulate *TORNADO* on-board DSP.
- jch Set high 20 MHz JTAG clock frequency for emulation port ‘L’ of *UECMX*. This option is valid only in case *UECMX* is installed onto *TORNADO* mainboard and is configured to emulate *TORNADO* on-board DSP.
- jcu Set ultra-high 40 MHz JTAG clock frequency for emulation port ‘L’ of *UECMX*. This option is valid only in case *UECMX* is installed onto *TORNADO* mainboard and is configured to emulate *TORNADO* on-board DSP.
- d Display current status of *UECMX* emulation controller.
- pXXX Specify ISA-bus I/O base address for particular *UECMX* module installed. The *XXX* denotes the three digit hex value in accordance with table 2-1. Default value is assumed to be either default I/O base address from table 2-1, or I/O base address that is specified by *D\_OPTIONS* system variable for TI debuggers in case the latter is defined.
- ? Display list of valid options for *UECMXCC.EXE* utility. List of options is also displayed in case *UECMXCC.EXE* utility was invoked without any options specified.

*UECMXCC.EXE* utility returns exit code that can be processed by '*IF ERRORLEVEL*' operator inside MS-DOS .BAT command files immediately after invocation of the *UECMXCC.EXE* utility. List of valid exit codes is specified in table 3-1.

Table 3-1. Exit codes for *UECMXCC.EXE* software utility.

of exit code	description
0	No error.
255	Fatal error, which might occur in the following cases: <ul style="list-style-type: none"><li>specified command line options are invalid or not defined</li><li>specified I/O base address is invalid</li><li><i>UECMX</i> hardware is not operating perfectly</li></ul>