Kontron User's Guide

JFLEX-LAN

Document Revision 1.00

This page intentionally left blank

Table of Contents

1 User Information

1.1 About This Document

This document provides information about products from Kontron Embedded Modules GmbH and/or its subsidiaries. No warranty of suitability, purpose, or fitness is implied. While every attempt has been made to ensure that the information in this document is accurate, the information contained within is supplied “as-is” and is subject to change without notice.

For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

1.2 Copyright Notice

DIMM-PC®, PISA®, ETX®, ETXexpress®, microETXexpress™, X-board®, DIMM-IO® and DIMM-BUS® are trademarks or registered trademarks of Kontron Embedded Modules GmbH. Kontron is trademark or registered trademark of Kontron AG.

1.3 Trademarks

The following lists the trademarks of components used in this board.

- IBM, XT, AT, PS/2 and Personal System/2 are trademarks of International Business Machines Corp.
- Microsoft is a registered trademark of Microsoft Corp.
- Intel is a registered trademark of Intel Corp.
- All other products and trademarks mentioned in this manual are trademarks of their respective owners.

1.4 Standards

Kontron Embedded Modules GmbH is certified to ISO 9000 standards.

1.5 Warranty

This Kontron Embedded Modules GmbH product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron Embedded Modules GmbH will at its discretion decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

Kontron Embedded Modules GmbH will not be responsible for any defects or damages to other products not supplied by Kontron Embedded Modules GmbH that are caused by a faulty Kontron Embedded Modules GmbH product.

1.6 Technical Support

Technicians and engineers from Kontron Embedded Modules GmbH and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

Please consult our Web site at http://www.kontron.com/support for the latest product documentation, utilities, drivers and support contacts. In any case you can always contact your board supplier for technical support.

2 Introduction

2.1 JFLEX-LAN module

The JFLEX-LAN module is an extension board for Kontrons Jrex 3,5'' embedded line SBC family.

Following features are provided by the JFLEX-LAN module:

- 1x Davicom 9102A PCI single Ethernet chip
- 10BASE-T/100BASE-T LAN Fast Ethernet network interface (NIC) controller
- 2x USB 2.0 ports

2.2 JRex Concept

The JFLEX-LAN module is part of a family of I/O extensions for Kontron's JRex family. JRex is a 3.5" SBC family from Kontron Embedded Modules (formerly JUMPtec®). JRex interfaces for connectivity and expansion always are in the same position on the front side of unit and include reset, ATX feature, 2xUSB, LAN, keyboard/mouse socket, Compact Flash™, VGA, and COM1.

JFLEX is an add-on I/O extension module that you can firmly place on top of every JRex without affecting the JRex 3.5" SBC footprint. Because they are mostly cable free, the JFLEX modules enable low cost products while minimizing manual errors. The stackable JFLEX concept allows low-cost, customizable I/O extensions.

3 Specifications

3.1 Functional Specifications

- USB
  - 2 x USB 2.0 ports (OHCI/EHCI) (USB UHCI Host Controller2 in BIOS must be enabled. Unavailable with the JRex-GX1.)
- Ethernet
  - 1 x 10/100 Base-T twisted pair Davicom controller

3.2 Mechanical Specifications

- 82.55mm x 80.2mm (3.25” x 3.16”)

3.3 Electrical Specifications

3.3.1 Supply Voltage

- 5V DC +/- 5%
- 3.3V DC =/- 5%

3.3.2 Supply Voltage Ripple

- 100 mV peak to peak 0 - 20 MHz

3.3.3 Supply Current

- @5V (nom. 30ma / max. 70mA)

3.4 Environmental Specifications

3.4.1 Temperature

- Operating: 0 to +60 C (*) (with appropriate airflow)
- Non-operating: -10 to +85 °C (noncondensing)

Note:
The maximum operating temperature is the maximum measurable temperature on any spot on the module's surface. You must maintain the temperature according to the above specification.

3.4.2 Humidity

- Operating: 10% to 90% (noncondensing)
- Nonoperating: 5% to 95% (noncondensing)

4 Ethernet Interface

4.1 Ethernet Controller

The JFLEX-LAN module Ethernet interface uses one Davicom DM9102AE PCI Fast Ethernet controllers. The network controllers support a 10/100Base-T interface. The device auto-negotiates the use of a 10Mbit/sec or 100Mbit/sec connection.

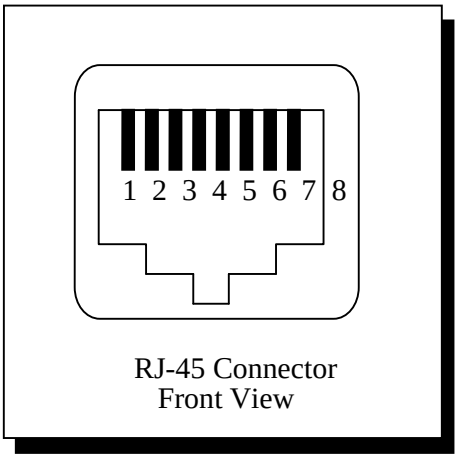
All major network-operating systems and several real-time and embedded operating systems support the interface.

The DM9102A provides:

- Integrated Fast Ethernet MAC, Physical Layer, and transceiver in one chip 74612 memory mapper
- Compliance with PCI Specification 2.2
- PCI bus master architecture
- EEPROM 93C46 interface supports node-ID and access-configuration information
- Compliance with IEEE 802.3u 100Base-TX and 802.3 10Base-T
- Compliance with IEEE 802.3u auto-negotiation protocol for automatic link-type selection
- Full-duplex/half-duplex capability
- Supports IEEE 802.3x full duplex flow control
- Digital-clock recovery circuit using advanced digital algorithm to reduce jitter
- High-performance 100Mbps-clock generator and data-recovery circuit
- Loopback mode for easy system diagnostics

4.2 Connector

The 10/100 Base-T connector is a standard 8-pin RJ45 jack.



RJ-45 Connector
Front View

4.2.1 RJ45 Pinout

Pin	Signal Name	Function	In / Out
1	TXD+1	100/10BASE-T Transmit	Differential Output
2	TXD-1	100/10BASE-T Transmit	Differential Output
3	RXD+2	100/10BASE-T Receive	Differential Input
4	NC	Unused Pin	
5	NC	Unused Pin	
6	RXD-2	100/10BASE-T Receive	Differential Input
7	NC	Unused Pin	
8	NC	Unused Pin	

Notes:

1TXD+, TXD- Differential output pair drives 10 and 100Mb/s Manchester-encoded data to the 100/10BASE-T transmit lines.

2RXD+, RXD- Differential input pair receives 10 and 100Mb/s Manchester-encoded data from the 100/10BASE-T receive lines.

4.3 Ethernet Technical Support

You can solve some Ethernet problems by using the latest drivers for the DAVICOM DM9102A controller. Kontron provides you with the latest tested drivers, which can differ from newer ones.

For further technical support, contact either Kontron or obtain support information and download software updates from DAVICOM.

5 USB Interface

5.1 General description

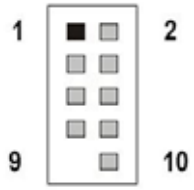
The JFLEX-pass module supports two USB2.0 ports. You can expand the USB ports by adding external hubs up to an amount of 127 USB peripherals per port.

5.2 Connectors

The JFLEX-pass module has two USB standard connectors X4-X5 and one strip connector X2 parallel to X4-X5. For details see Chapter6 “APPENDIX B: MECHANICAL DIMENSIONS AND CONNECTOR LAYOUT.

! Do not use X4-X5 together with X2 at same time except “Screen” pin10 of X2.

5.2.1 X2 Pinout



Pin	Signal Name	Function
1	+5V	VCC USB3 1)
2	+5V	VCC USB4 1)
3	Data3 -	USB3
4	Data4 -	USB4
5	Data3+	USB3
6	Data4+	USB4
7	GND	GND USB3
8	GND	GND USB4
9	Key	Pin removed
10	GND screen	Screen

Notes:
1) Current supply on each Pin1-2 (USB VCC) is limited to 500mA.

To protect the external power lines of peripheral devices, make sure that:
- the wires have the right diameter to withstand the maximum available current
- the enclosure of the peripheral device fulfils the fire-protecting requirements of
-- IEC/EN 60950

6 Performance test

6.1 Network Performance

6.1.1 General Settings

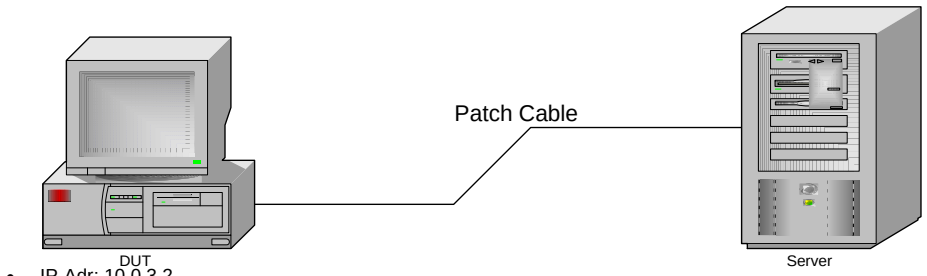
Additional Hardware	Register
50m 100BaseT cable	
Crossed 100BaseT Ethernet patch cable	
Ethernet Hub 10/100	EA0252
EVAL Server	

Used Software	Register
Windows XP Prof. SP2	
NetIO V.123	

6.1.2 Patch Cable Test

Patch Cable Test Preparation

Pertoper Connection between DUT and Eval_Server via a crossed 100BaseT Ethernet patch cable.



- IP-Adr: 10.0.3.2
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_client
- Workgroup: EVAL
- Speed settings: Auto
- Connection Type: Auto

- IP-Adr: 10.0.3.1
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_server
- Workgroup: EVAL
- Speed settings: 100 Mbps
- Connection Type: Half Duplex

Patch Cable Test Flow

➤ Run [win32-i386.exe –t –s] in Server mode on the Eval_Server. Run [win32-i386.exe –t 10.0.3.1] in Client mode on the DUT and evaluate the benchmark results at various packet sizes.

NetIO Patch Cable Test Result (Half Duplex)

TCP/IP connection established.		
Packet size 1k bytes:	10038 KByte/s Tx,	8452 KByte/s Rx.
Packet size 2k bytes:	10018 KByte/s Tx,	8561 KByte/s Rx.
Packet size 4k bytes:	10524 KByte/s Tx,	9395 KByte/s Rx.
Packet size 8k bytes:	10504 KByte/s Tx,	8911 KByte/s Rx.
Packet size 16k bytes:	10542 KByte/s Tx,	8291 KByte/s Rx.
Packet size 32k bytes:	10625 KByte/s Tx,	8478 KByte/s Rx.

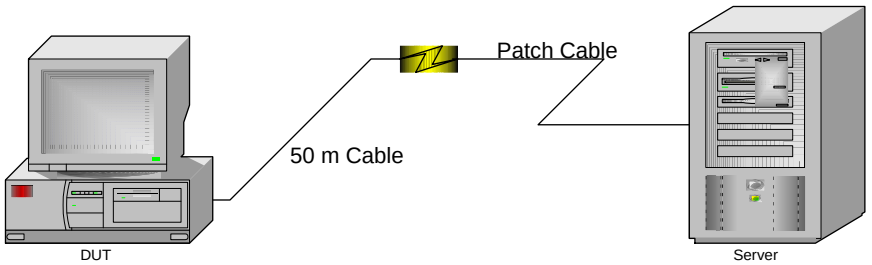
NetIO Patch Cable Test Result (Full Duplex)

TCP/IP connection established.		
Packet size 1k bytes:	10025 KByte/s Tx,	11291 KByte/s Rx.
Packet size 2k bytes:	10021 KByte/s Tx,	11290 KByte/s Rx.
Packet size 4k bytes:	10545 KByte/s Tx,	11502 KByte/s Rx.
Packet size 8k bytes:	10535 KByte/s Tx,	11503 KByte/s Rx.
Packet size 16k bytes:	10567 KByte/s Tx,	11503 KByte/s Rx.
Packet size 32k bytes:	10691 KByte/s Tx,	11542 KByte/s Rx.

6.1.3 Long Distance Cable Test

Long Distance Cable Test Preparation

Connect DUT and Eval_Server via a 100BaseT Ethernet cable with a length of 50m and a crossed 100BaseT Ethernet patch cable.



- IP-Adr: 10.0.3.2
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_client
- Workgroup: EVAL
- Speed settings: 100Mbps
- Connection Type: Full Duplex

- IP-Adr: 10.0.3.1
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_server
- Workgroup: EVAL
- Speed settings: 100Mbps
- Connection Type: Full Duplex

Long Distance Cable File transfer Result (Full Duplex)

PerToper connection.		
	500MB/68s (7,35MB/s)	to EVAL server
	500MB/60s (8,3 MB/s)	from EVAL server

NetIO Long Distance Cable Test Result (Half Duplex)

TCP/IP connection established.		
Packet size 1k bytes:	10044 KByte/s Tx,	7865 KByte/s Rx.
Packet size 2k bytes:	10016 KByte/s Tx,	7906 KByte/s Rx.
Packet size 4k bytes:	10523 KByte/s Tx,	8002 KByte/s Rx.
Packet size 8k bytes:	10502 KByte/s Tx,	8207 KByte/s Rx.
Packet size 16k bytes:	10525 KByte/s Tx,	8288 KByte/s Rx.
Packet size 32k bytes:	10601 KByte/s Tx,	8357 KByte/s Rx.

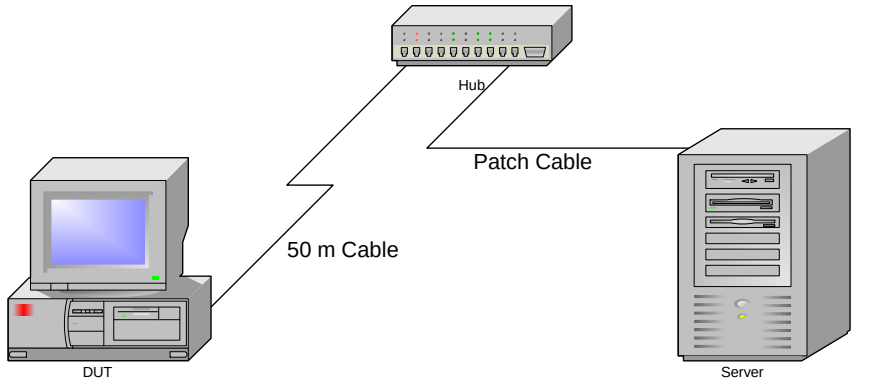
NetIO Long Distance Cable Test Result (Full Duplex)

TCP/IP connection established.		
Packet size 1k bytes:	10049 KByte/s Tx,	11292 KByte/s Rx.
Packet size 2k bytes:	10023 KByte/s Tx,	11288 KByte/s Rx.
Packet size 4k bytes:	10543 KByte/s Tx,	11478 KByte/s Rx.
Packet size 8k bytes:	10539 KByte/s Tx,	11501 KByte/s Rx.
Packet size 16k bytes:	10551 KByte/s Tx,	11504 KByte/s Rx.
Packet size 32k bytes:	10690 KByte/s Tx,	11542 KByte/s Rx.

6.1.4 Hub Test

Hub Test Preparation

Connect DUT and Eval_Server via a hub, 50m 100BaseT cable and a crossed 100BaseT Ethernet patch cable.



- IP-Adr: 10.0.3.2
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_client
- Workgroup: EVAL
- Speed settings: Auto
- Connection Type: Auto

- IP-Adr: 10.0.3.1
- Subnet Mask: 255.255.255.0
- Computer Name: EVAL_server
- Workgroup: EVAL
- Speed settings: 100Mbps
- Connection Type: Full Duplex

NetIO HUB Test Result (Full Duplex)

TCP/IP connection established.		
Packet size 1k bytes:	9896 KByte/s Tx,	11289 KByte/s Rx.
Packet size 2k bytes:	10006 KByte/s Tx,	11288 KByte/s Rx.
Packet size 4k bytes:	10443 KByte/s Tx,	11501 KByte/s Rx.
Packet size 8k bytes:	10396 KByte/s Tx,	11500 KByte/s Rx.
Packet size 16k bytes:	10427 KByte/s Tx,	11503 KByte/s Rx.
Packet size 32k bytes:	10532 KByte/s Tx,	11542 KByte/s Rx.

6.2 USB Performance

6.2.1 General Settings

Additional Hardware	Register
WesternDigital USB HDD	EA0430
EVAL Server	

Used Software	Register
Windows XP Prof. SP2	
HD Tash	

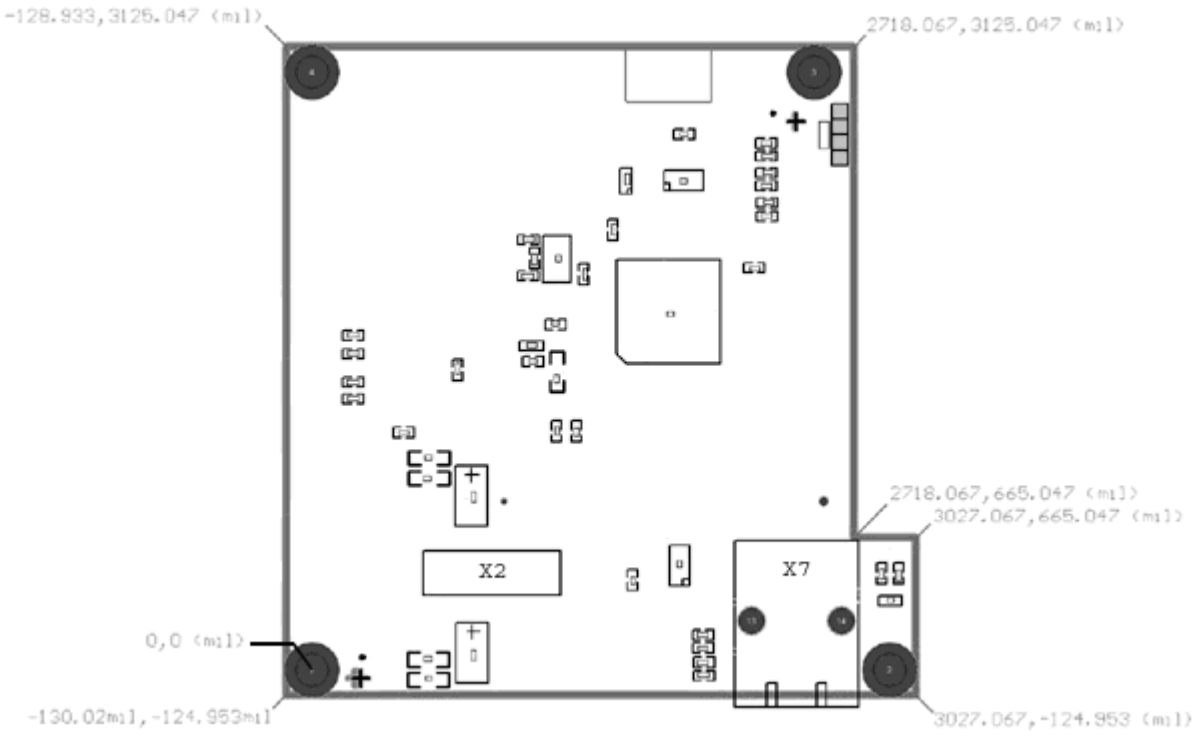
6.2.2 Test Results

File Transfer *1	HD Tash (Read Mode)
500MB/38s(13,15MB/s) from Local HDD to USB HDD 500MB/27s(18,52MB/s) from USB HDD to Local HDD	Port3 24,3MB/s Port4 24,3MB/s

*1) File transfer speed is limited to USB hard drive speed.

7 Appendix B: Mechanical Dimensions and Connector Layout

The following illustration shows the mechanical dimensions and layout of the connectors for the JFLEX-pass module.



8 Appendix C: PC Architecture Information

8.1 Buses and USB Information

8.1.1 PCI

- PCI SIG
  The PCI-SIG provides a forum for 900 companies that develop PCI products based on specifications created by the PCI-SIG.
- PCI & PCI-X Hardware and Software Architecture & Design, Fifth Edition, Edward Solari and George Willse, Annabooks, 2001, ISBN 0-929392-63-9.
- PCI System Architecture, Tom Shanley and Don Anderson, Addison-Wesley, 2000, ISBN 0-201-30974-2.

8.1.2 USB

USB Specification
USB Implementers Forum, Inc. is a non-profit corporation founded by companies that developed the Universal Serial Bus (USB) specification. The USB-IF provides a support organization and forum to advance and adopt USB technology.

9 Appendix D: Document Revision History

Version	Date	Edited by	Changes
1.0	06.02.2009	HAM	Created manual