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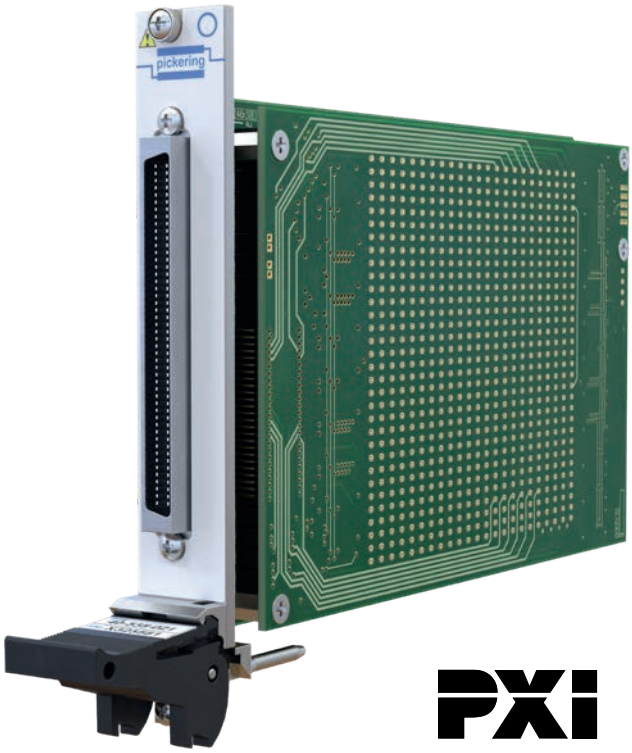
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Find the *Pickering 40-536-021* at our website: ***Click HERE***

40-535/536/537 User Manual

PXI Ultra High Density Matrix Module



PXI

Issue 5.1 February 2020

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Reg No. FM38792

TECHNICAL SUPPORT

For Technical Support please contact Pickering Interfaces either by phone, the website or via e-mail.

WARRANTY

All products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years, excluding programmable power supplies, from the date of delivery to the original purchaser. Any product found to be defective within this period will, at the discretion of Pickering Interfaces be repaired or replaced.

Products serviced and repaired outside of the warranty period are warranted for ninety days.

Extended warranty and service are available. Please contact Pickering Interfaces by phone, the website or via e-mail.

ENVIRONMENTAL POLICY

Pickering Interfaces operates under an environmental management system similar to ISO 14001.

Pickering Interfaces strives to fulfil all relevant environmental laws and regulations and reduce wastes and releases to the environment. Pickering Interfaces aims to design and operate products in a way that protects the environment and the health and safety of its employees, customers and the public. Pickering Interfaces endeavours to develop and manufacture products that can be produced, distributed, used and recycled, or disposed of, in a safe and environmentally friendly manner.

Worldwide Technical Support and Product Information

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PRODUCT SAFETY

SAFETY SYMBOLS

The following safety symbols may be used on the product and throughout the product documentation.

MEANING / DESCRIPTION	SYMBOL
PROTECTIVE EARTH (GROUND) To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.	
DANGEROUS VOLTAGE To indicate hazards arising from dangerous voltages.	
WARNING / CAUTION An appropriate safety instruction should be followed or caution to a potential hazard exists. Refer to the relevant instructions detailed within the product manual.	
HEAVY If this product is heavy reference should be made to the safety instructions for provisions of lifting and moving.	
STATIC SENSITIVE To indicate that static sensitive devices are present and handling precautions should be followed.	

CONTENTS

Copyright Statement II

Technical Support and Warranty III

Product Safety IV

Contents (this page) V

Warnings and Cautions VII

Section 1
Technical Specification 1.1

Section 2
Technical Description 2.1
- Functional Description 2.1

Section 3
Installation 3.1
- Pre Operation Checks 3.1
- Hardware Installation 3.2
- Software Installation 3.2
- Testing Operation 3.3

Section 4
Programming Guide 4.1
- Programming Options For Pickering PXI Modules 4.1
- Module Architecture 4.2
- Programming The Module 4.3

Section 5
Connector Information 5.1

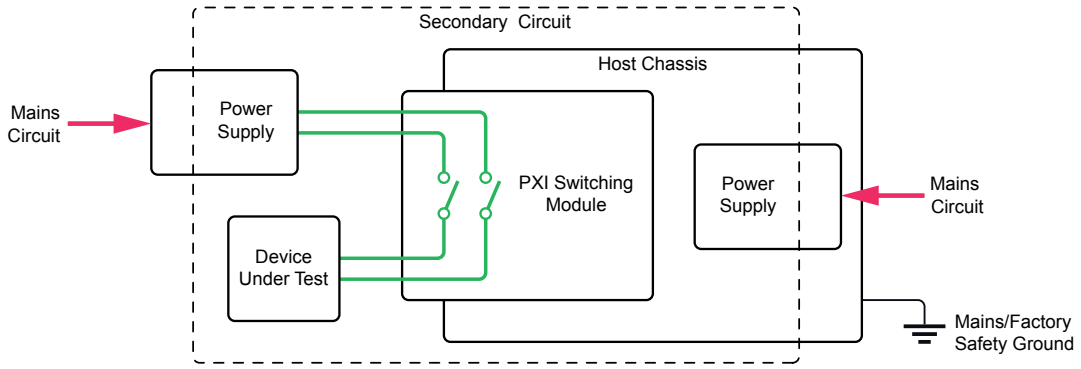
Section 6
Trouble Shooting 6.1

Section 7
Maintenance Information 7.1
- Switching System Test Tools 7.1
- Relay Lookup Tables 7.1

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WARNINGS AND CAUTIONS

WARNING - HAZARDOUS ENVIRONMENTS	SYMBOL
This product is not specifically designed for use in hazardous environments, for example in explosive atmospheres. If the product is to be used in hazardous environments we recommend that the user ensures suitable protective measures are taken.	

WARNING - DANGER OF ELECTRIC SHOCK	SYMBOL
This module may contain hazardous voltages. Before removing the module from the rack remove all supplies and disconnect user I/O signals. Unused slots in the host chassis are populated with blanking plates to prevent access to user I/O signals that may be present. Blanking panels are available to order from Pickering in a variety of slot widths. If the product is not used in this manner for example by using an extender card then additional care must be taken to avoid contact with exposed signals. Not to be used in safety critical circuits, refer to the Pickering Interfaces' terms & conditions of sale. This module must not be used for the switching of Mains Circuits. For the switching of voltages up to the module's full specification, Secondary Circuit power supplies and the Device Under Test must be fully isolated from the Mains Circuit and the safety earth. The host chassis must be correctly installed and be connected to mains or factory safety ground, please refer to your chassis installation manual.  **Diagram Showing Separation Between The Mains Circuit and Secondary Circuit / DUT** For the purposes of this document, a Mains Circuit is an installation classified as Overvoltage Category II up to 300V. Separation between the Secondary Circuit and Mains Circuit is achieved by a transformer in which the primary windings are separated from the secondary windings by reinforced insulation, double insulation, or a screen connected to the protective conductor terminal.	

CAUTION - HANDLING OF ELECTROSTATIC-SENSITIVE DEVICES	SYMBOL
Certain semiconductor devices used in this equipment are liable to damage due to static voltage. Observe the following precautions when handling these devices in their unterminated state, or sub-assemblies containing these devices: 1. Persons removing sub-assemblies from equipment using these devices must be earthed by a wrist strap and a resistor at the point provided on the equipment. 2. Soldering irons used during the repair operations must be low voltage types with earthed tips and isolated from the mains voltage by a double insulated transformer. 3. Outer clothing worn must be unable to generate static charges. 4. Printed Circuit Boards (PCBs) fitted with these devices must be stored and transported in anti-static bags.	

CAUTION - PRODUCT DOCUMENTATION	SYMBOL
Suitably qualified & trained users should ensure that the accompanying documentation is fully read and understood before attempting to install or operate the product.	

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS
All cleaning and servicing requires the equipment to be isolated and disconnected from the power source and user I/O signals (refer to the Maintenance Section). • Appropriate manual handling procedures should be followed as dictated by the weight of the individual module or the combined weight of the modules & chassis. • Should a fault occur with the module or chassis, immediately isolate and disconnect the incoming power to the chassis and the user I/O signals. • Ensure the equipment is installed, operated and maintained by trained and authorised personnel. • For suitably equipped products in the event of an emergency press the red “emergency stop” button situated on the front of the unit.

SECTION 1 - TECHNICAL SPECIFICATION

- Ultra High Density Reed Relay Matrix Modules With Up To 368 Crosspoints
- Single 92x4, Dual 44x4 & Single 44x8 Matrix Configurations
- 1-Pole Switching
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <1000µs
- Switch up to 150 Volts with 10W Max Power
- Max Switch Current 0.5A
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by *eBIRST*™
- 3 Year Warranty



The 40-535/536/537 are ultra high density PXI switching matrices constructed with reed relays. The range is as follows:

- 40-535-021 Single 92x4 matrix, 1-pole
- 40-536-021 Dual 44x4 matrix, 1-pole
- 40-537-021 Single 44x8 matrix, 1-pole

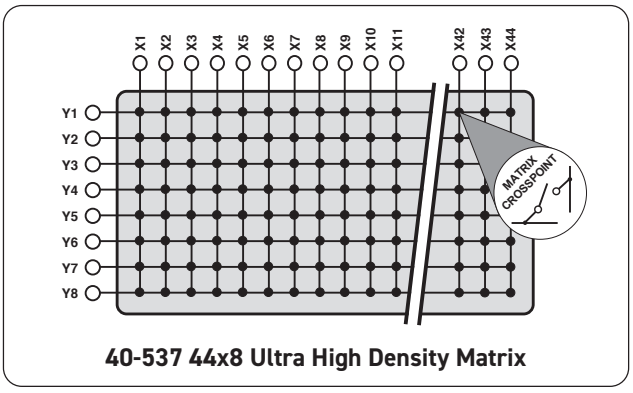
Typical applications include signal routing in Functional ATE and data acquisition systems. These matrix modules are constructed using high reliability sputtered ruthenium reed relays, offering 10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by daisy chaining the common signals from multiple modules. However, for applications that require a very large matrix, Pickering's BRIC™ modules are best suited.

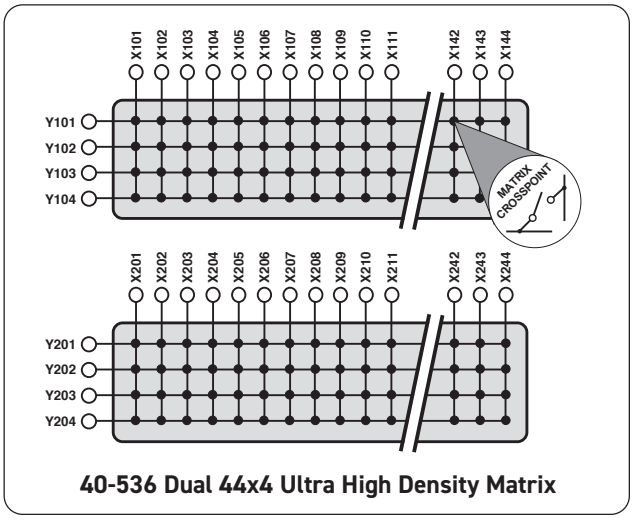
Supported by *eBIRST*

eBIRST switching system test tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

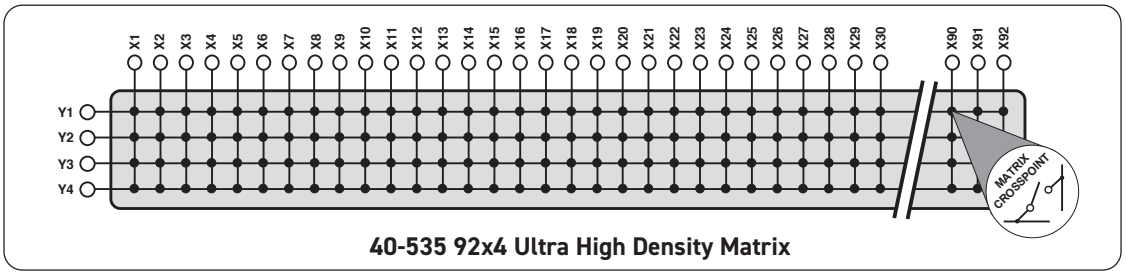
For more information go to: pickeringtest.com/ebirst



40-537 44x8 Ultra High Density Matrix



40-536 Dual 44x4 Ultra High Density Matrix



40-535 92x4 Ultra High Density Matrix

Relay Type

The 40-535/536/537 modules are fitted with ruthenium sputtered reed relays, these offer very long life with good low level switching performance and excellent contact resistance stability. Spare reed telays are built onto the circuit board to allow easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics: pickeringrelay.com

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC*
Max Power:	10W
Max Switch Current:	0.5A
Max Carry Current:	0.5A
Initial Path Resistance	
On (Single Module):	<1000mΩ
Off (Single Module):	$>10^9\Omega$
Thermal Offset:	<5µV
Operate Time:	<1ms, 0.5ms typical
Release Time:	<1ms, 0.5ms typical
Expected Life	
Low power load:	$1x10^9$ operations
Full power load:	$>5x10^6$ operations

* For full voltage rating, signal sources to be switched must be fully isolated from mains supply and safety earth.

Power Requirements

+3.3V	+5V	+12V	-12V
0	800mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 380g (40-536-021).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 96-pin male micro-D connector, for pin outs please refer to the operating manual.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

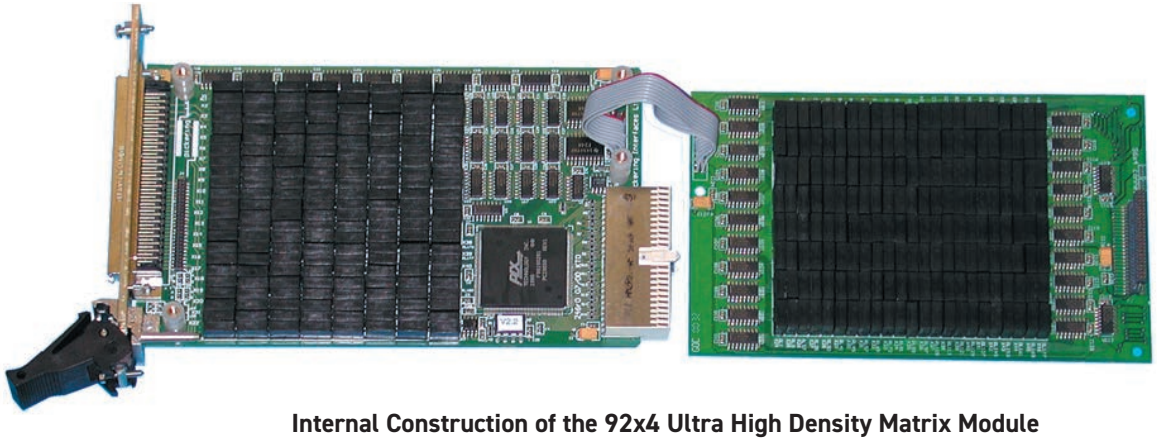
PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses a 33MHz 32-bit backplane interface.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2010, EMC Immunity EN61326-1:2013, Emissions EN55011:2009+A1:2010.



Internal Construction of the 92x4 Ultra High Density Matrix Module

Product Order Codes

Single 92x4 Matrix Module, 1 Pole	40-535-021
Dual 44x4 Matrix Module, 1 Pole	40-536-021
Single 44x8 Matrix Module, 1 Pole	40-537-021

Product Customization

Pickering PXI modules are designed and manufactured on our own flexible manufacturing lines, giving complete product control and enabling simple customization to meet very specific requirements.

Customization can include:

- Alternative reed relay types
- Mixture of reed relay types
- Alternative number of relays
- Different performance specifications

All customized products are given a unique part number, fully documented and may be ordered at any time in the future. Please contact your local sales office to discuss.

Support Products

eBIRST Switching System Test Tool

This product is supported by the *eBIRST* test tools which simplify the identification of failed relays, the required *eBIRST* tools are below. For more information go to: pickeringtest.com/ebirst

Product	Test Tool	Adaptor	Termination
40-535/6/7	93-002-001	93-002-226	93-016-103

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-535-021	91-100-006
40-536-021	91-100-006
40-537-021	91-537-009

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-535/536/537 modules please refer to the 90-016D 96-pin micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Chassis Compatibility

This PXI module must be used in a suitable chassis. It is compatible with the following chassis types:

- All chassis conforming to the 3U PXI and 3U Compact PCI (cPCI) specification
- Legacy and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis
- Pickering Interfaces LXI or LXI/USB Modular Chassis



Chassis Selection Guide

Standard PXI or hybrid PXIe Chassis from any Vendor:

- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization

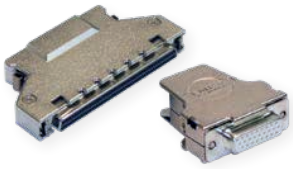


Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation
- Independence from Windows operating system

Connectivity Solutions

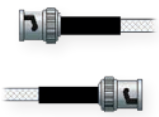
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed to mechanically and electrically mate to our modules.



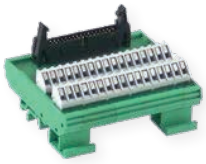
Connectors & Backshells



Multiway Cable Assemblies



RF Cable Assemblies



Connector Blocks

We also offer customized cabling and have a free online **Cable Design Tool** that can be used to create custom cable solutions for many applications.
Visit: pickeringtest.com/cdt to start your design.



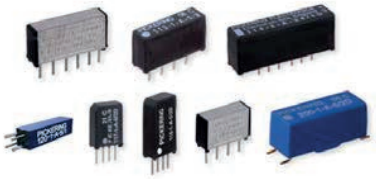
Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for a PXI or LXI based test system. Our modules are fully supported by both Virginia Panel and MacPanel.

Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our sister company, Pickering Electronics. These instrument grade reed relays feature ***SoftCenter***® technology, ensuring long service life and repeatable contact performance.

To learn more, please go to: pickeringrelay.com



Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions. For a list of all supporting operating systems, please see: pickeringtest.com/os

The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Keysight** VEE and OpenTAP
- **Mathworks** Matlab
- **Marvin** ATEasy
- **MTQ Testsolutions** Tecap Test & Measurement Suite

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.
To learn more about software drivers and development environments, please go to: pickeringtest.com/software



Signal Routing Software

Our signal routing software, Switch Path Manager, automatically selects and energizes switch paths through Pickering switching systems. Signal routing is performed by simply defining test system endpoints to be connected together, greatly accelerating Test System software development. To learn more, please go to: pickeringtest.com/spm



Diagnostic Relay Test Tools

eBIRST Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.
To learn more, please go to: pickeringtest.com/ebirst

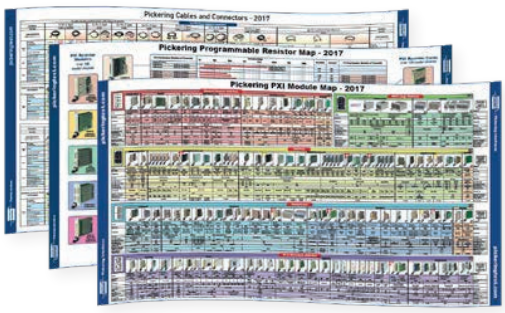
Three Year Warranty & Guaranteed Long-Term Support

All standard products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available for all our modules and systems with various levels to suit your requirements. Although we offer a 3-year warranty as standard, we also include guaranteed long-term support—with a history of supporting our products for typically 15-20 years. To learn more, please go to: pickeringtest.com/support

Available Product Resources

We have a large library of product resources including success stories, product and support videos, articles, as well as complete product catalogs and product reference maps to assist when looking for the switching, simulation and cable and connector solutions you need. We have also published handy reference books on Switching Technology and for the PXI and LXI standards.







To view, download or request any of our product resources, please visit: pickeringtest.com/resources

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SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 2.1. The Ultra High Density Matrix Module is powered by a +5V input via Compact PCI connector J1. The interface to the user test equipment is via the front panel mounted 96-pin micro-D connector, J2. The module comprises one PCB populated with single pole reed relays which are energised via control signals from relay drivers. The relay drivers are addressed by PCI bridge U1 to output the required signal. Module configuration is determined by hardwired links and data stored in EEPROM U8. PCI Bridge U1 is configured by EEPROM U2.

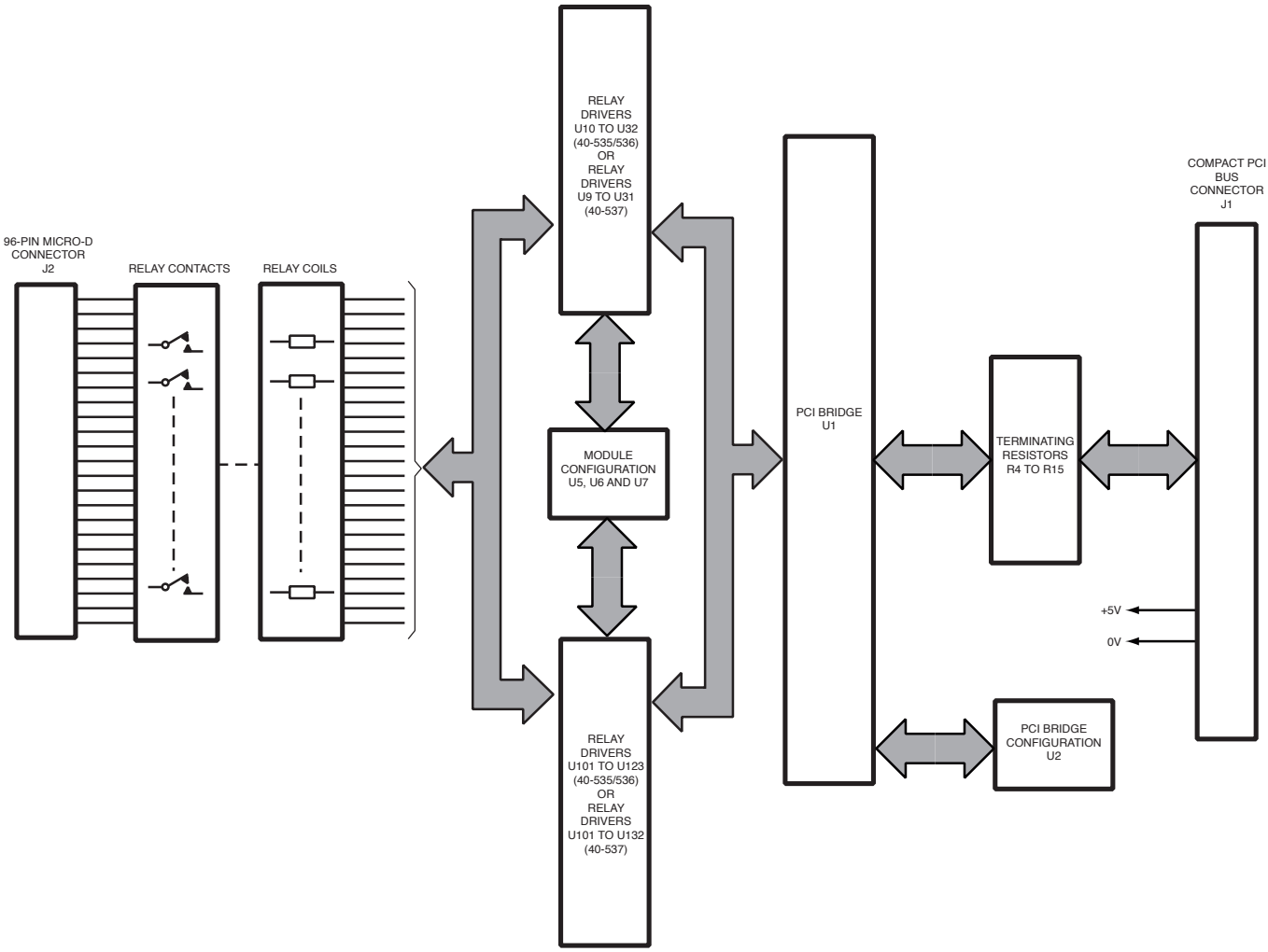


Figure 2.1 - Ultra High Density Matrix Module (40-535/536/537): Functional Block Diagram

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SECTION 3 - INSTALLATION

Refer to the Warnings and Cautions at the front of this manual

Modular products require installation in a suitable PXI/LXI chassis. The module is designed for indoor use only.

PREOPERATION CHECKS (UNPACKING)

1. Check the module for transport damage and report any damage immediately to Pickering Interfaces. Do not attempt to install the product if any damage is evident.
2. Position the chassis relative to any other equipment the module(s) will connect with. Ensure the chassis is not connected to the electrical supply.
3. Ensure that the designated area for the chassis containing the module is of flat and solid construction to withstand and support the combined weight of the module(s) and chassis.

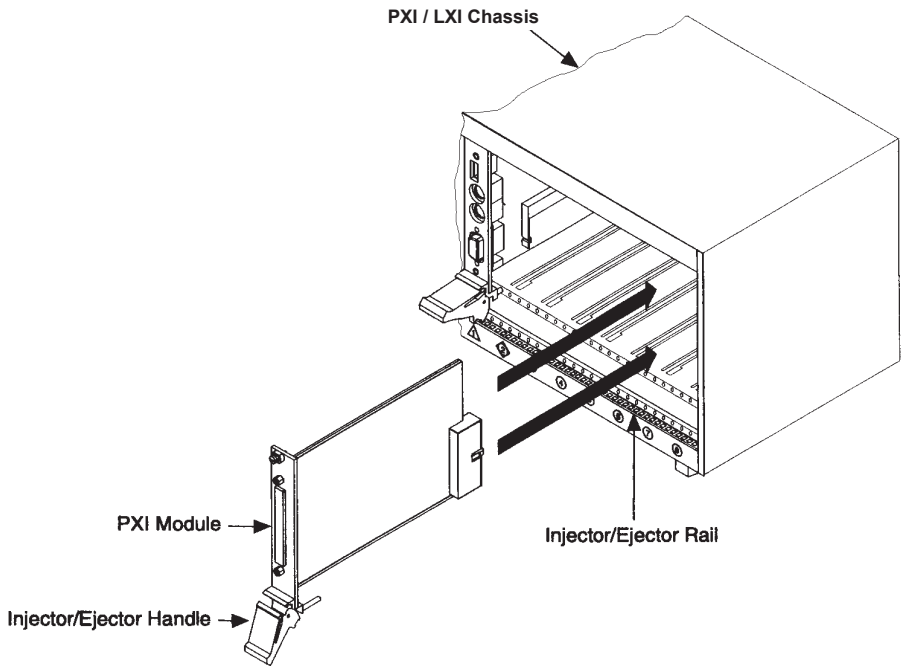


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

HARDWARE INSTALLATION
ELECTRICAL CONNECTION (CHASSIS)

1. The chassis must be electrically installed in accordance with local regional electrical codes by a qualified engineer.
2. The chassis must be grounded.

Electrostatic discharge can damage the components on the module. To avoid such damage in handling the board refer to page VII.

Ensure that there is adequate ventilation.

The module should be installed in accordance with the following procedure:

1. Ensure that the system is turned OFF but still connected to mains so that it remains grounded.
2. Choose an appropriate slot in the rack.
3. Remove the blanking plate for the chosen slot.
4. Ensure that the injector/ejector handle is in its downward position. Align the module with the card guides on the top and bottom of the slot.

   Do not raise the injector/ejector handle whilst inserting the module as the module will not insert properly.
5. Hold the handle whilst slowly sliding the module into the card guides until the handle catches on the injector/ejector rail (refer to Figure 3.1).
6. Raise the injector/ejector handle until the module firmly seats into the backplane. The front panel of the module should be flush with the front panel of the chassis.
7. Secure the front panel of the module using both screws to the chassis front panel mounting rails.
8. In a system employing a remote control interface to connect an external controller to a PXI chassis or to link multiple chassis, power-up the system as follows:
   a. For a system comprising an external controller and one chassis, power up the chassis before powering up the external controller.
   b. For a system comprising more than one chassis, turn ON the last chassis in the system followed by the penultimate, etc, and finally turn ON the external controller or chassis containing the system controller.
9. For Pickering Interfaces modular LXI installation there is no requirement to use any particular power up sequence.

SOFTWARE INSTALLATION

First install the appropriate Pickering PXI switch card drivers by running the installer program Setup.exe (provided in a compressed zip file), either from the CD-ROM supplied, or by downloading the latest version from our website **pickeringtest.com** - the recommended method. Setup is accompanied by a ReadMe file containing additional installation information. A single installation covers all cards in the System 40, System 45 and System 50 ranges.

When installation completes, the installed drivers' ReadMe file is offered for display. It can also be displayed later using a shortcut on the Programs>>Pickering menu.

If you are not a LabVIEW user you should choose the "full" version, and once that has been installed run the LabVIEW Runtime Engine installer via the shortcut on the Programs>>Pickering menu. In the absence of LabVIEW the Runtime Engine is required to support the Pickering Test Panels application.

TESTING OPERATION

After installation of the hardware and Pickering PXI Driver software package start the General Soft Front Panel (GSFP) using the desktop icon or via the Start menu (***Start Menu-> Pickering Interfaces Ltd -> General Soft Front Panel***).



Figure 3.2 - General Soft Front Panel Icon

A selector panel will appear, listing all installed Pickering PCI, PXI or LXI switch cards and resistor cards. Click on the card you wish to control, and a graphical control panel is presented allowing operation of the card. Panels can be opened simultaneously for all the installed cards.

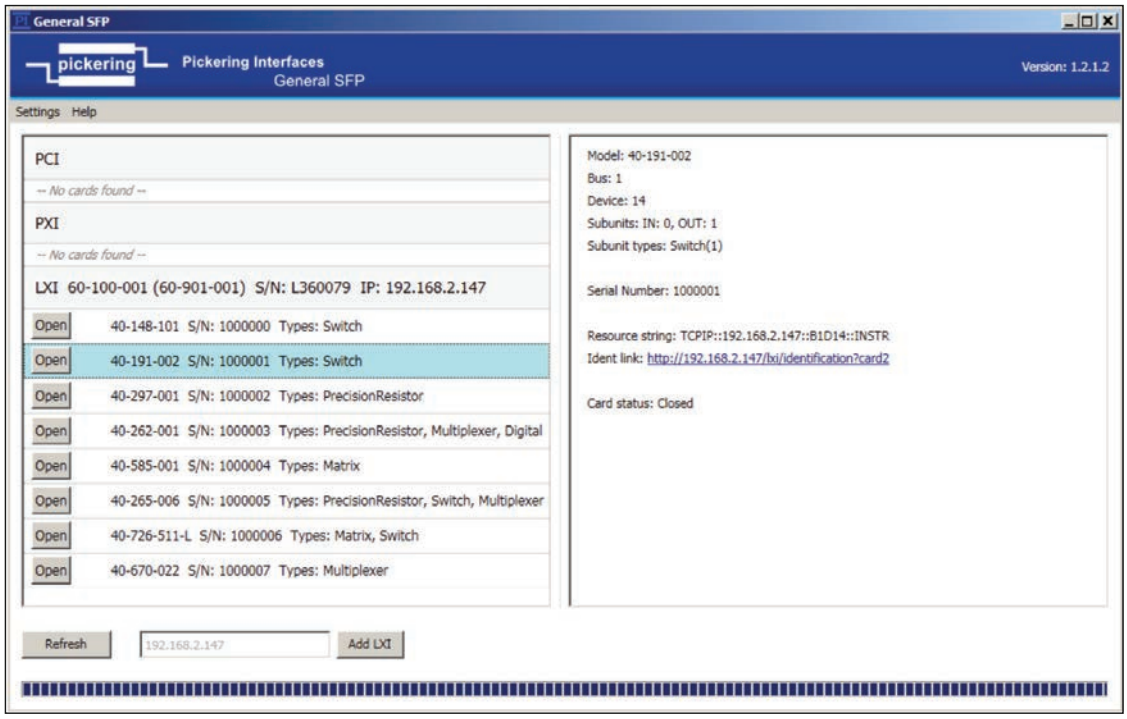


Figure 3.3 - General Soft Front Panel Selector

More details how to use the GSFP can be found in the manual, via menu ***Help\Manual***

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SECTION 4 - PROGRAMMING GUIDE

PROGRAMMING OPTIONS FOR PICKERING INTERFACES PXI MODULES

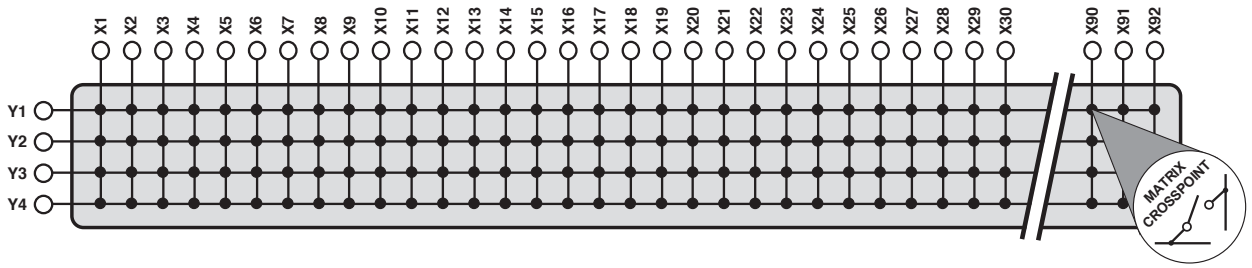
For information on the installation and use of drivers and the programming of Pickering's products in various software environments, please refer to the Software User Manual.

This is available as a download from:
https://www.pickeringtest.com/support/software-drivers-and-downloads

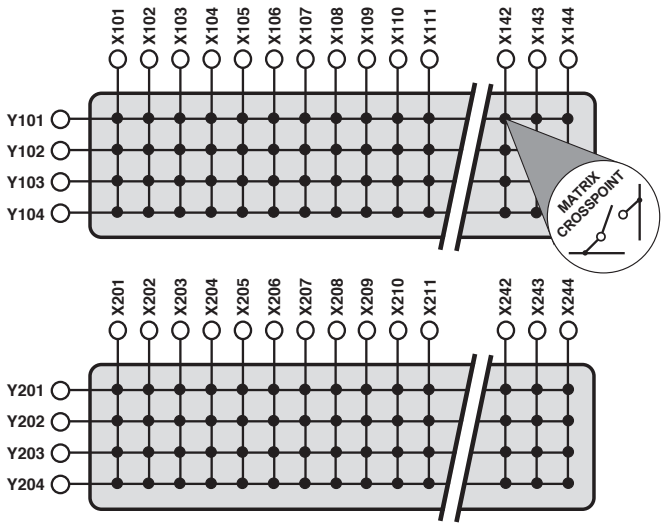
Also, it can be accessed from the DVD supplied with the product:
<DVD_DRIVE>\downloads\Documentation\Software-Manual.pdf

MODULE ARCHITECTURE

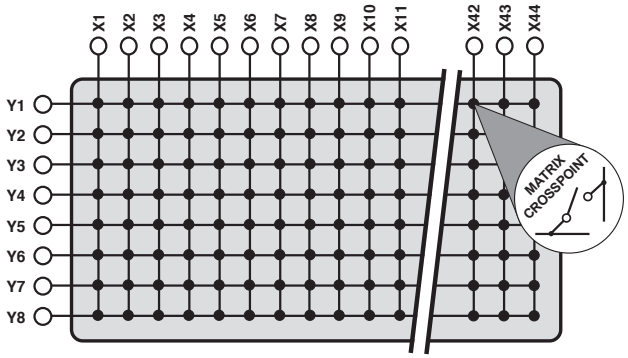
The 40-535 is a single 1-pole switching matrix with 92 connections on the X-axis and 4 connections on the Y-axis. Connections are made by operating the relays at the crosspoints between X and Y lines allowing single X-Y connections, or X-X connections using a Y line as a path. The 40-536 and 40-537, are controlled in the same way but are a dual 16x8 matrix and a single 44x8 matrix respectively.



40-535-021 Single 92x4 1-Pole Matrix



40-536-021 Dual 44x4 1-Pole Matrix



40-537-021 Single 44x8 1-Pole Matrix

In the case of single matrices, the entire matrix is treated as a single programming sub-unit designated as Sub-Unit 1. The dual matrix is divided into sub-units 1 and 2. The following page gives some simple examples using the provided drivers: the IVI driver, the Direct IO driver, and the IVI compliant driver.

PROGRAMMING THE MODULE

Using The IVI Driver, Direct I/O Driver or VISA Driver

This section provides some code fragments which show how to control the matrix using the IVI Driver, Direct I/O Driver or the VISA Driver.

Once the drivers are installed the manual “Sys40Prg.pdf” and driver help files which fully describes these functions can be found in the Pickering folder(s) or the Pickering entries on your Start Menu.

The card must be opened before use and closed after using the following function calls:

Direct I/O Driver - Open with `PIL_OpenCards` or `PIL_OpenSpecifiedCard` and close with `PIL_CloseCards` or `PIL_CloseSpecifiedCards` respectively.

VISA Driver - Open with `pipx40_init`, and close with, `pipx40_close`.

Setting a Matrix Crosspoint:

Using the IVI driver:

Note: the following example is for bank 1 of a dual matrix. Bank 1 is identified as A, bank 2 would be identified as B, and a single matrix would have no letter identifier.

```
pi40iv_Connect(vi, xA1, yA2); //set crosspoint x1, y2 to on
pi40iv_Disonnect(vi, xA1, yA2); //set crosspoint x1, y2 to off
```

Using the Pickering Direct I/O driver:

```
DWORD SubUnit = 1;    //select bank 1 (dual matrix) or whole matrix (single matrix)
PIL_ClearSub(CardNo, SubUnit);    //clear all crosspoints to off state
PIL_OpCrosspoint(CardNo, SubUnit, 2, 1, 1); //set crosspoint x1, y2 to on
PIL_OpCrosspoint(CardNo, SubUnit, 2, 1, 0); //set crosspoint x1, y2 to off
```

Using the VISA driver:

```
ViUInt32 SubUnit = 1; //select bank 1 (dual matrix) or whole matrix (single matrix)
pipx40_clearSub(vi, SubUnit); //clear all crosspoints off state
pipx40_setCrosspointState (vi, SubUnit, 2, 1, VI_ON); //set crosspoint x1, y2 on
pipx40_setCrosspointState (vi, SubUnit, 2, 1, VI_OFF); //set crosspoint x1, y2 off
```

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SECTION 5 - CONNECTOR INFORMATION

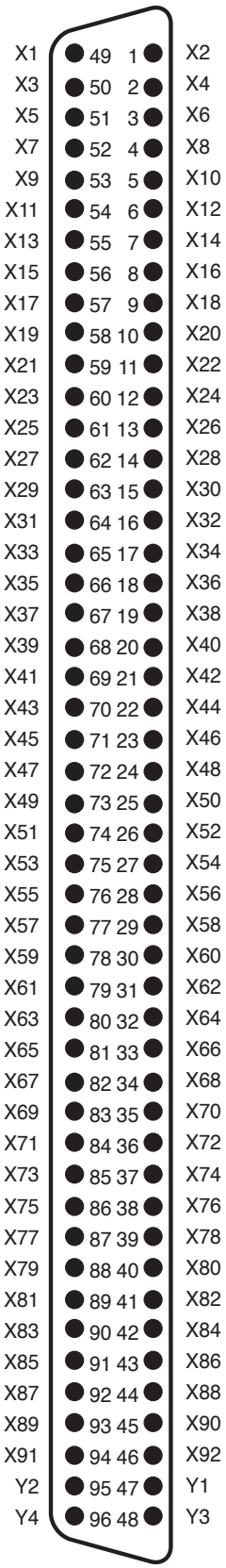


Figure 5.1 - Pinout: 40-535-021 Single 1-Pole 92x4 Ultra High Density Matrix Module (96-pin male micro-D connector viewed from front of module)

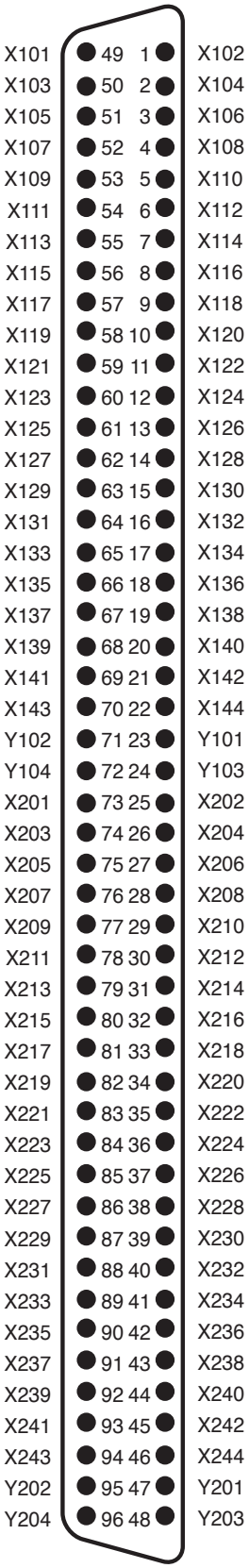


Figure 5.2 - Pinout: 40-536-021 Dual 1-Pole 44x4 Ultra High Density Matrix Module (96-pin male micro-D connector viewed from front of module)

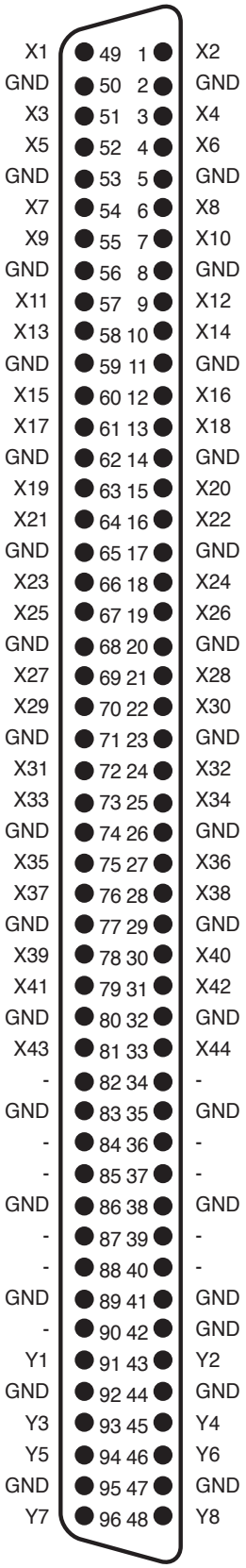


Figure 5.3 - Pinout: 40-537-021 & 40-537-021-S Single 1-Pole 44x8 Ultra High Density Matrix Module (96-pin male micro-D connector viewed from front of module)

Note: On the screened version, reed relay screen is connected to the the front panel ground (GND).

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SECTION 6 - TROUBLE SHOOTING

Refer to the Warnings and Cautions at the front of this manual 

INSTALLATION PROBLEMS

The Plug & Play functionality of Pickering switch cards generally ensures trouble-free installation.

If you do experience any installation problems you should first ensure that all cards are properly seated in their slots. Improperly mated cards may go undetected by the operating system, or may be detected as a card of an unknown type. They can also cause the computer to freeze at various stages in the boot sequence.

If your system employs a remote control interface you should check the integrity of all remote control interface links. When the system is powered up, and during Windows start-up, you should expect to see periodic activity on the remote control interface RX/TX (yellow) indicators, clearing to leave only the PWR/LNK (green) LEDs illuminated. The RX/TX indicators should show activity when you attempt to access a card.

DIAGNOSTIC UTILITY

The Pickering Diagnostic Utility (accessible through the Programs>>Pickering>>PXI Utilities menu) generates a diagnostic report of the system's PCI configuration, highlighting any potential configuration problems. Specific details of all installed Pickering switch cards are included. All the installed Pickering switch cards should be listed in the "Pilpxi information" section - if one or more cards is missing it may be possible to determine the reason by referring to the PCI configuration dump contained in the report, but interpretation of this information is far from straightforward, and the best course is to contact Pickering support: support@pickeringtest.com, if possible including a copy of the diagnostic report.

In the "VISA information" section, if VISA is not installed its absence will be reported. This does not affect operation using the Direct I/O driver, and is not a problem unless you wish to use VISA. VISA is a component of National Instruments LabWindows/CVI and LabVIEW, or is available as a standalone environment.

If VISA is present and is of a sufficiently recent version, the section "Pipx40 information" should present a listing similar to "Pilpxi information".

Please note that the Diagnostic Utility cannot access cards if they are currently opened by some other application, such as the Test Panels or Terminal Monitor.

SWITCHING SYSTEM TEST TOOLS

Please refer to Section 7 - Maintenance Information.

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SECTION 7 - MAINTENANCE INFORMATION

Refer to the Warnings and Cautions at the front of this manual 

PERIODIC MAINTENANCE

This product and its corresponding chassis do not require any periodic maintenance.

GENERAL CLEANING

- Isolate the electrical power from the chassis and ensure that no user I/O signals are being applied.
- Wipe the product & chassis surfaces with a clean dry anti-static cloth only.

SOFTWARE UPDATE

For PXI modules operating in a PXI chassis, no module software updates are required. For the latest version of the driver please refer to our web site **pickeringtest.com** where links to our Software Download page will provide the latest version of the driver software for the various programming environments encountered.

For PXI modules which are supported in one of Pickering Interfaces' Modular LXI Chassis (such as the 60-102B and 60-103B) no module software update is required. If the module was introduced after the LXI chassis was manufactured the module may not be recognized, in this case the chassis firmware may need upgrading. This is a simple process which is described in the manual for the Modular LXI Chassis.

SWITCHING SYSTEM TEST TOOLS

We recommend the use of ***eBIRST*** to provide a check of the correct operation of relays and to identify the location of any faulty relay. For more information on ***eBIRST*** click here.

RELAY LOOK-UP TABLES

The following pages provide a cross reference between the signal paths of the product and the physical relays on the PCB. The tables can be used in the fault finding process and should be used in conjunction with the corresponding PCB layout diagrams to identify the position of faulty relays. Users of ***eBIRST*** switching system test tools do not need to use this information to locate faulty relays.

NOTE

This is a very high density design, as a consequence removal of the relays can be awkward since there is no access to the relay sides to grip them during de-soldering. Further guidance on removal can be obtained on our Knowledgebase http://wiki.pickeringtest.net/Replacing+Relays or search the Knowledgebase for "Replacing Relays".

RELAY LOOK-UP TABLES

NOTE: Relays on the motherboard are highlighted in blue and relays on the daughterboard are highlighted in yellow.

TABLE 7.1 - 92x4 Ultra High Density Matrix 40-535-021 Relay Numbering - Motherboard

Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.
X	Y		X	Y		X	Y		X	Y	
1	1	1	1	2	47	1	3	93	1	4	139
2	1	2	2	2	48	2	3	94	2	4	140
3	1	3	3	2	49	3	3	95	3	4	141
4	1	4	4	2	50	4	3	96	4	4	142
5	1	5	5	2	51	5	3	97	5	4	143
6	1	6	6	2	52	6	3	98	6	4	144
7	1	7	7	2	53	7	3	99	7	4	145
8	1	8	8	2	54	8	3	100	8	4	146
9	1	9	9	2	55	9	3	101	9	4	147
10	1	10	10	2	56	10	3	102	10	4	148
11	1	11	11	2	57	11	3	103	11	4	149
12	1	12	12	2	58	12	3	104	12	4	150
13	1	13	13	2	59	13	3	105	13	4	151
14	1	14	14	2	60	14	3	106	14	4	152
15	1	15	15	2	61	15	3	107	15	4	153
16	1	16	16	2	62	16	3	108	16	4	154
17	1	17	17	2	63	17	3	109	17	4	155
18	1	18	18	2	64	18	3	110	18	4	156
19	1	19	19	2	65	19	3	111	19	4	157
20	1	20	20	2	66	20	3	112	20	4	158
21	1	21	21	2	67	21	3	113	21	4	159
22	1	22	22	2	68	22	3	114	22	4	160
23	1	23	23	2	69	23	3	115	23	4	161
24	1	24	24	2	70	24	3	116	24	4	162
25	1	25	25	2	71	25	3	117	25	4	163
26	1	26	26	2	72	26	3	118	26	4	164
27	1	27	27	2	73	27	3	119	27	4	165
28	1	28	28	2	74	28	3	120	28	4	166
29	1	29	29	2	75	29	3	121	29	4	167
30	1	30	30	2	76	30	3	122	30	4	168
31	1	31	31	2	77	31	3	123	31	4	169
32	1	32	32	2	78	32	3	124	32	4	170
33	1	33	33	2	79	33	3	125	33	4	171
34	1	34	34	2	80	34	3	126	34	4	172
35	1	35	35	2	81	35	3	127	35	4	173
36	1	36	36	2	82	36	3	128	36	4	174
37	1	37	37	2	83	37	3	129	37	4	175
38	1	38	38	2	84	38	3	130	38	4	176
39	1	39	39	2	85	39	3	131	39	4	177
40	1	40	40	2	86	40	3	132	40	4	178
41	1	41	41	2	87	41	3	133	41	4	179
42	1	42	42	2	88	42	3	134	42	4	180
43	1	43	43	2	89	43	3	135	43	4	181
44	1	44	44	2	90	44	3	136	44	4	182
45	1	45	45	2	91	45	3	137	45	4	183
46	1	46	46	2	92	46	3	138	46	4	184

TABLE 7.2 - 92x4 Ultra High Density Matrix 40-535-021 Relay Numbering - Daughterboard

Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.
X	Y		X	Y		X	Y		X	Y	
47	1	1	47	2	47	47	3	93	47	4	139
48	1	2	48	2	48	48	3	94	48	4	140
49	1	3	49	2	49	49	3	95	49	4	141
50	1	4	50	2	50	50	3	96	50	4	142
51	1	5	51	2	51	51	3	97	51	4	143
52	1	6	52	2	52	52	3	98	52	4	144
53	1	7	53	2	53	53	3	99	53	4	145
54	1	8	54	2	54	54	3	100	54	4	146
55	1	9	55	2	55	55	3	101	55	4	147
56	1	10	56	2	56	56	3	102	56	4	148
57	1	11	57	2	57	57	3	103	57	4	149
58	1	12	58	2	58	58	3	104	58	4	150
59	1	13	59	2	59	59	3	105	59	4	151
60	1	14	60	2	60	60	3	106	60	4	152
61	1	15	61	2	61	61	3	107	61	4	153
62	1	16	62	2	62	62	3	108	62	4	154
63	1	17	63	2	63	63	3	109	63	4	155
64	1	18	64	2	64	64	3	110	64	4	156
65	1	19	65	2	65	65	3	111	65	4	157
66	1	20	66	2	66	66	3	112	66	4	158
67	1	21	67	2	67	67	3	113	67	4	159
68	1	22	68	2	68	68	3	114	68	4	160
69	1	23	69	2	69	69	3	115	69	4	161
70	1	24	70	2	70	70	3	116	70	4	162
71	1	25	71	2	71	71	3	117	71	4	163
72	1	26	72	2	72	72	3	118	72	4	164
73	1	27	73	2	73	73	3	119	73	4	165
74	1	28	74	2	74	74	3	120	74	4	166
75	1	29	75	2	75	75	3	121	75	4	167
76	1	30	76	2	76	76	3	122	76	4	168
77	1	31	77	2	77	77	3	123	77	4	169
78	1	32	78	2	78	78	3	124	78	4	170
79	1	33	79	2	79	79	3	125	79	4	171
80	1	34	80	2	80	80	3	126	80	4	172
81	1	35	81	2	81	81	3	127	81	4	173
82	1	36	82	2	82	82	3	128	82	4	174
83	1	37	83	2	83	83	3	129	83	4	175
84	1	38	84	2	84	84	3	130	84	4	176
85	1	39	85	2	85	85	3	131	85	4	177
86	1	40	86	2	86	86	3	132	86	4	178
87	1	41	87	2	87	87	3	133	87	4	179
88	1	42	88	2	88	88	3	134	88	4	180
89	1	43	89	2	89	89	3	135	89	4	181
90	1	44	90	2	90	90	3	136	90	4	182
91	1	45	91	2	91	91	3	137	91	4	183
92	1	46	92	2	92	92	3	138	92	4	184

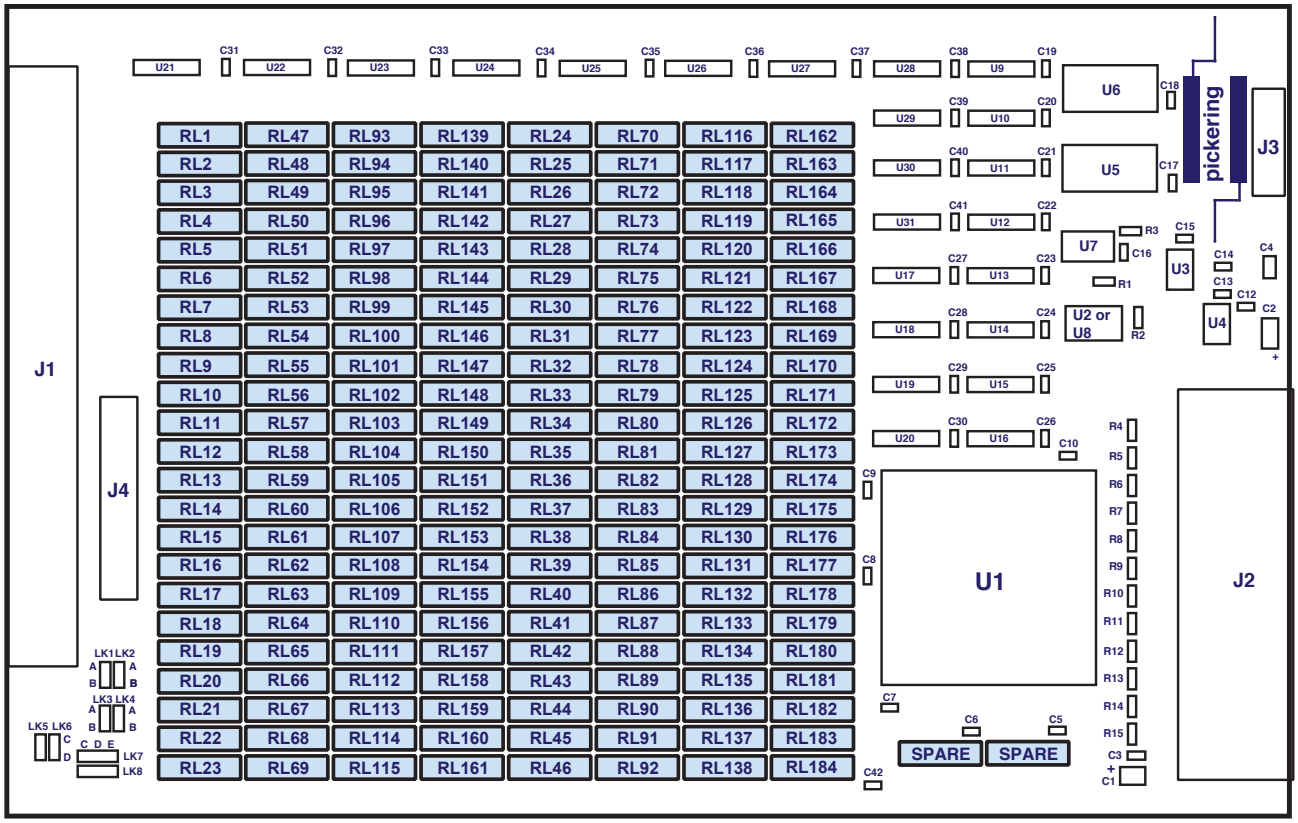


Figure 7.1 - 40-535 Ultra High Density Matrix Module Motherboard Layout

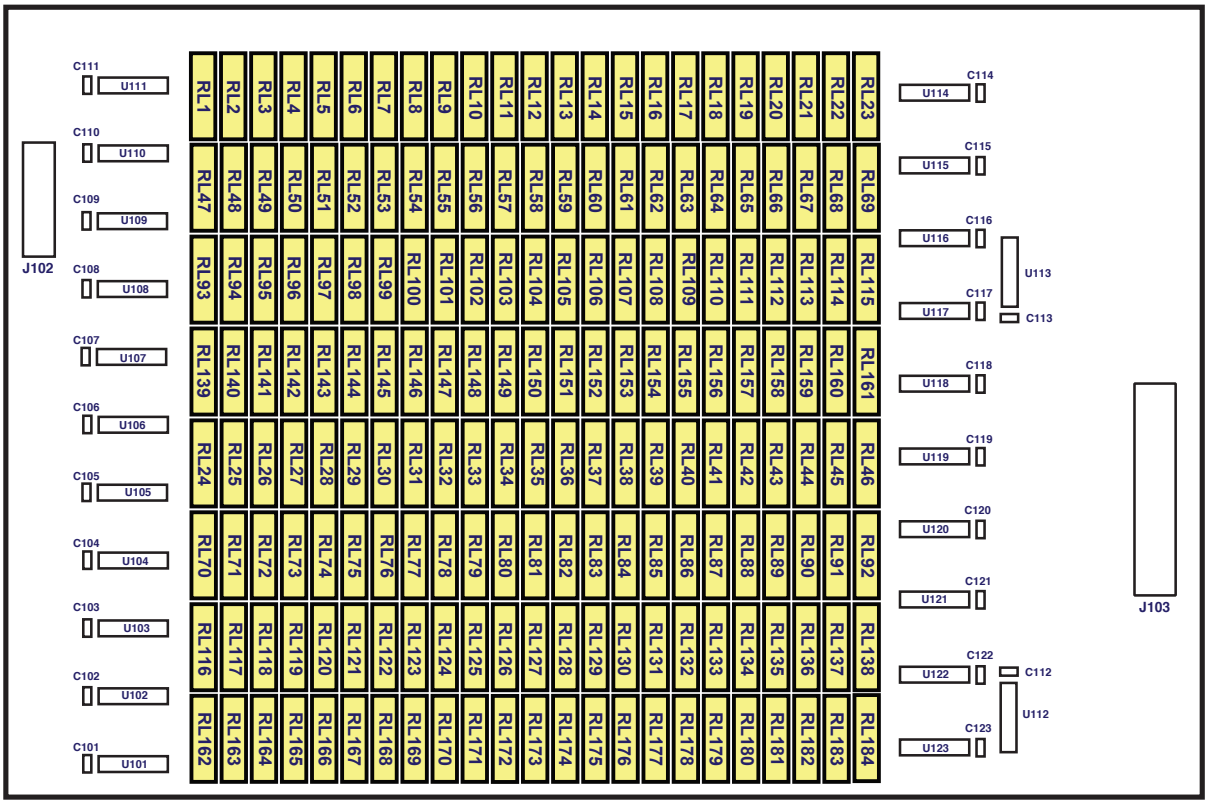


Figure 7.2 - 40-535 Ultra High Density Matrix Module Daughterboard Layout

TABLE 7.3 - Dual44x4 Ultra High Density Matrix 40-536-021 Relay Numbering - Motherboard

Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.
X	Y		X	Y		X	Y		X	Y	
101	101	1	101	102	47	101	103	93	101	104	139
102	101	2	102	102	48	102	103	94	102	104	140
103	101	3	103	102	49	103	103	95	103	104	141
104	101	4	104	102	50	104	103	96	104	104	142
105	101	5	105	102	51	105	103	97	105	104	143
106	101	6	106	102	52	106	103	98	106	104	144
107	101	7	107	102	53	107	103	99	107	104	145
108	101	8	108	102	54	108	103	100	108	104	146
109	101	9	109	102	55	109	103	101	109	104	147
110	101	10	110	102	56	110	103	102	110	104	148
111	101	11	111	102	57	111	103	103	111	104	149
112	101	12	112	102	58	112	103	104	112	104	150
113	101	13	113	102	59	113	103	105	113	104	151
114	101	14	114	102	60	114	103	106	114	104	152
115	101	15	115	102	61	115	103	107	115	104	153
116	101	16	116	102	62	116	103	108	116	104	154
117	101	17	117	102	63	117	103	109	117	104	155
118	101	18	118	102	64	118	103	110	118	104	156
119	101	19	119	102	65	119	103	111	119	104	157
120	101	20	120	102	66	120	103	112	120	104	158
121	101	21	121	102	67	121	103	113	121	104	159
122	101	22	122	102	68	122	103	114	122	104	160
123	101	23	123	102	69	123	103	115	123	104	161
124	101	24	124	102	70	124	103	116	124	104	162
125	101	25	125	102	71	125	103	117	125	104	163
126	101	26	126	102	72	126	103	118	126	104	164
127	101	27	127	102	73	127	103	119	127	104	165
128	101	28	128	102	74	128	103	120	128	104	166
129	101	29	129	102	75	129	103	121	129	104	167
130	101	30	130	102	76	130	103	122	130	104	168
131	101	31	131	102	77	131	103	123	131	104	169
132	101	32	132	102	78	132	103	124	132	104	170
133	101	33	133	102	79	133	103	125	133	104	171
134	101	34	134	102	80	134	103	126	134	104	172
135	101	35	135	102	81	135	103	127	135	104	173
136	101	36	136	102	82	136	103	128	136	104	174
137	101	37	137	102	83	137	103	129	137	104	175
138	101	38	138	102	84	138	103	130	138	104	176
139	101	39	139	102	85	139	103	131	139	104	177
140	101	40	140	102	86	140	103	132	140	104	178
141	101	41	141	102	87	141	103	133	141	104	179
142	101	42	142	102	88	142	103	134	142	104	180
143	101	43	143	102	89	143	103	135	143	104	181
144	101	44	144	102	90	144	103	136	144	104	182
—	—	45	—	—	91	—	—	137	—	—	183
—	—	46	—	—	92	—	—	138	—	—	184

TABLE 7.4 - Dual 92x4 Ultra High Density Matrix 40-536-021 Relay Numbering - Daughterboard

Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.
X	Y		X	Y		X	Y		X	Y	
—	—	1	—	—	47	—	—	93	—	—	139
—	—	2	—	—	48	—	—	94	—	—	140
201	201	3	201	202	49	201	203	95	201	204	141
202	201	4	202	202	50	202	203	96	202	204	142
203	201	5	203	202	51	203	203	97	203	204	143
204	201	6	204	202	52	204	203	98	204	204	144
205	201	7	205	202	53	205	203	99	205	204	145
206	201	8	206	202	54	206	203	100	206	204	146
207	201	9	207	202	55	207	203	101	207	204	147
208	201	10	208	202	56	208	203	102	208	204	148
209	201	11	209	202	57	209	203	103	209	204	149
210	201	12	210	202	58	210	203	104	210	204	150
211	201	13	211	202	59	211	203	105	211	204	151
212	201	14	212	202	60	212	203	106	212	204	152
213	201	15	213	202	61	213	203	107	213	204	153
214	201	16	214	202	62	214	203	108	214	204	154
215	201	17	215	202	63	215	203	109	215	204	155
216	201	18	216	202	64	216	203	110	216	204	156
217	201	19	217	202	65	217	203	111	217	204	157
218	201	20	218	202	66	218	203	112	218	204	158
219	201	21	219	202	67	219	203	113	219	204	159
220	201	22	220	202	68	220	203	114	220	204	160
221	201	23	221	202	69	221	203	115	221	204	161
222	201	24	222	202	70	222	203	116	222	204	162
223	201	25	223	202	71	223	203	117	223	204	163
224	201	26	224	202	72	224	203	118	224	204	164
225	201	27	225	202	73	225	203	119	225	204	165
226	201	28	226	202	74	226	203	120	226	204	166
227	201	29	227	202	75	227	203	121	227	204	167
228	201	30	228	202	76	228	203	122	228	204	168
229	201	31	229	202	77	229	203	123	229	204	169
230	201	32	230	202	78	230	203	124	230	204	170
231	201	33	231	202	79	231	203	125	231	204	171
232	201	34	232	202	80	232	203	126	232	204	172
233	201	35	233	202	81	233	203	127	233	204	173
234	201	36	234	202	82	234	203	128	234	204	174
235	201	37	235	202	83	235	203	129	235	204	175
236	201	38	236	202	84	236	203	130	236	204	176
237	201	39	237	202	85	237	203	131	237	204	177
238	201	40	238	202	86	238	203	132	238	204	178
239	201	41	239	202	87	239	203	133	239	204	179
240	201	42	240	202	88	240	203	134	240	204	180
241	201	43	241	202	89	241	203	135	241	204	181
242	201	44	242	202	90	242	203	136	242	204	182
243	201	45	243	202	91	243	203	137	243	204	183
244	201	46	244	202	92	244	203	138	244	204	184

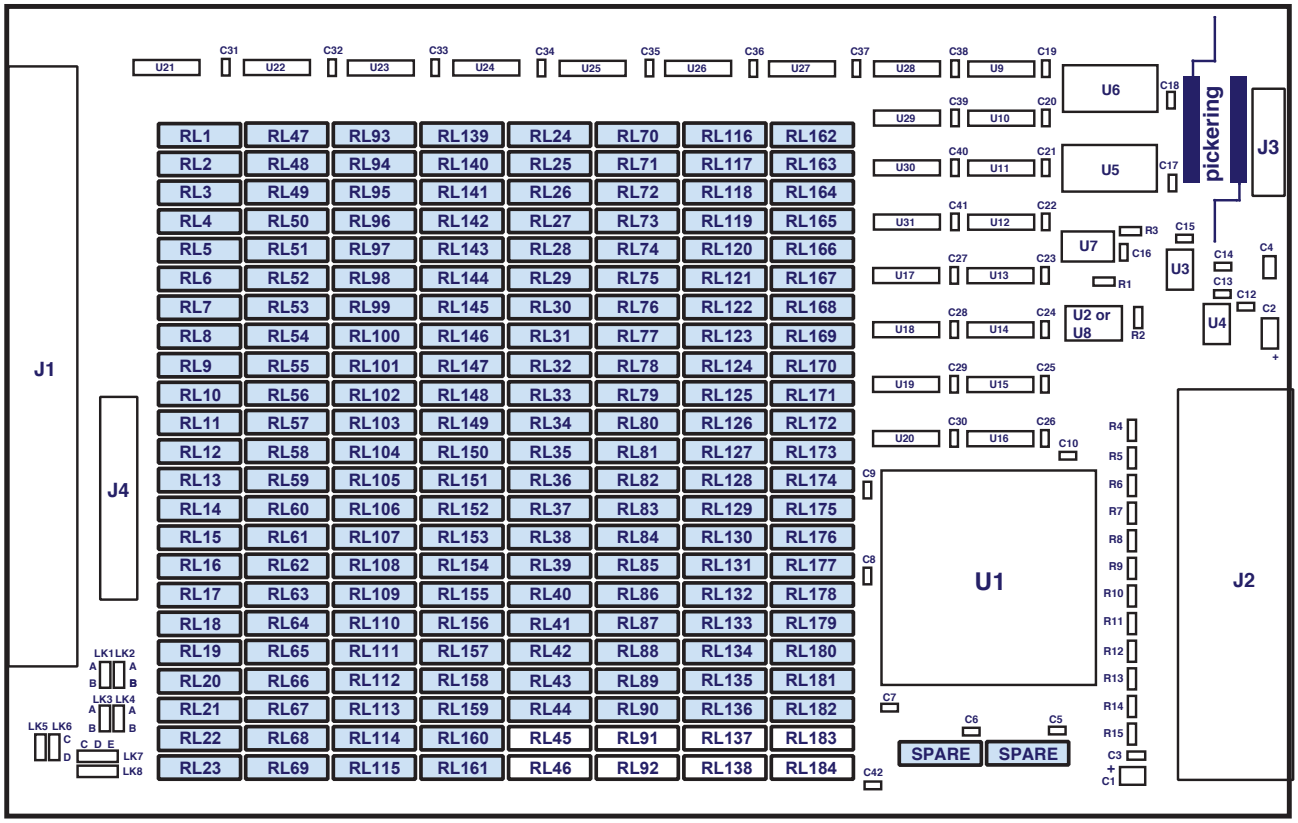


Figure 7.3 - 40-536 Ultra High Density Matrix Module Motherboard Layout

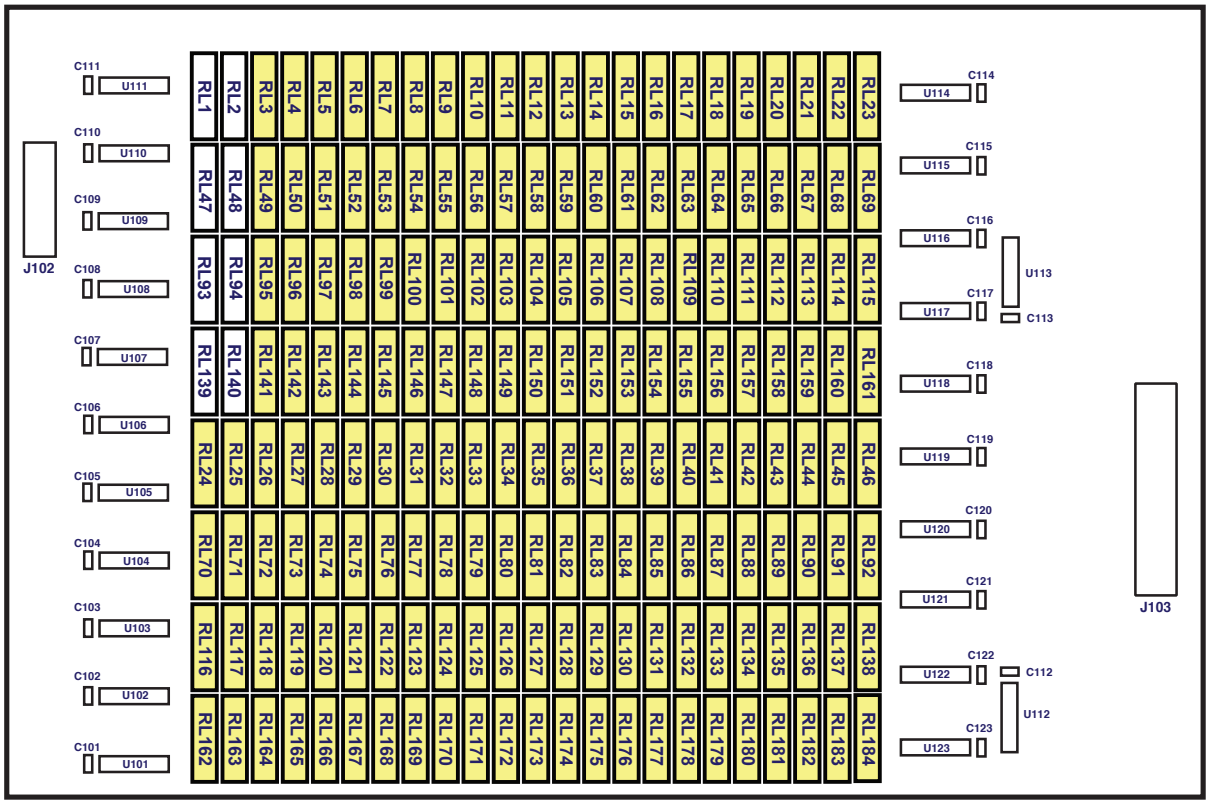


Figure 7.4 - 40-536 Ultra High Density Matrix Module Daughterboard Layout

TABLE 7.5 - 44x8 Ultra High Density Matrix 40-537 Relay Numbering - Motherboard

Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.
X	Y		X	Y		X	Y		X	Y	
1	1	1	7	1	49	13	1	97	19	1	145
1	2	2	7	2	50	13	2	98	19	2	146
1	3	3	7	3	51	13	3	99	19	3	147
1	4	4	7	4	52	13	4	100	19	4	148
1	5	5	7	5	53	13	5	101	19	5	149
1	6	6	7	6	54	13	6	102	19	6	150
1	7	7	7	7	55	13	7	103	19	7	151
1	8	8	7	8	56	13	8	104	19	8	152
2	1	9	8	1	57	14	1	105	20	1	153
2	2	10	8	2	58	14	2	106	20	2	154
2	3	11	8	3	59	14	3	107	20	3	155
2	4	12	8	4	60	14	4	108	20	4	156
2	5	13	8	5	61	14	5	109	20	5	157
2	6	14	8	6	62	14	6	110	20	6	158
2	7	15	8	7	63	14	7	111	20	7	159
2	8	16	8	8	64	14	8	112	20	8	160
3	1	17	9	1	65	15	1	113	21	1	161
3	2	18	9	2	66	15	2	114	21	2	162
3	3	19	9	3	67	15	3	115	21	3	163
3	4	20	9	4	68	15	4	116	21	4	164
3	5	21	9	5	69	15	5	117	21	5	165
3	6	22	9	6	70	15	6	118	21	6	166
3	7	23	9	7	71	15	7	119	21	7	167
3	8	24	9	8	72	15	8	120	21	8	168
4	1	25	10	1	73	16	1	121	22	1	169
4	2	26	10	2	74	16	2	122	22	2	170
4	3	27	10	3	75	16	3	123	22	3	171
4	4	28	10	4	76	16	4	124	22	4	172
4	5	29	10	5	77	16	5	125	22	5	173
4	6	30	10	6	78	16	6	126	22	6	174
4	7	31	10	7	79	16	7	127	22	7	175
4	8	32	10	8	80	16	8	128	22	8	176
5	1	33	11	1	81	17	1	129	23	1	177
5	2	34	11	2	82	17	2	130	23	2	178
5	3	35	11	3	83	17	3	131	23	3	179
5	4	36	11	4	84	17	4	132	23	4	180
5	5	37	11	5	85	17	5	133	23	5	181
5	6	38	11	6	86	17	6	134	23	6	182
5	7	39	11	7	87	17	7	135	23	7	183
5	8	40	11	8	88	17	8	136	23	8	184
6	1	41	12	1	89	18	1	137			
6	2	42	12	2	90	18	2	138			
6	3	43	12	3	91	18	3	139			
6	4	44	12	4	92	18	4	140			
6	5	45	12	5	93	18	5	141			
6	6	46	12	6	94	18	6	142			
6	7	47	12	7	95	18	7	143			
6	8	48	12	8	96	18	8	144			

TABLE 7.6 - 44x8 Ultra High Density Matrix 40-537 Relay Numbering - Daughterboard

Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.	Matrix Crosspoint		Relay No.
X	Y		X	Y		X	Y		X	Y		X	Y	
24	1	1	31	1	57	38	1	113	—	—	169	—	—	225
24	2	2	31	2	58	38	2	114	—	—	170	—	—	226
24	3	3	31	3	59	38	3	115	—	—	171	—	—	227
24	4	4	31	4	60	38	4	116	—	—	172	—	—	228
24	5	5	31	5	61	38	5	117	—	—	173	—	—	229
24	6	6	31	6	62	38	6	118	—	—	174	—	—	230
24	7	7	31	7	63	38	7	119	—	—	175	—	—	231
24	8	8	31	8	64	38	8	120	—	—	176	—	—	232
25	1	9	32	1	65	39	1	121	—	—	177	—	—	233
25	2	10	32	2	66	39	2	122	—	—	178	—	—	234
25	3	11	32	3	67	39	3	123	—	—	179	—	—	235
25	4	12	32	4	68	39	4	124	—	—	180	—	—	236
25	5	13	32	5	69	39	5	125	—	—	181	—	—	237
25	6	14	32	6	70	39	6	126	—	—	182	—	—	238
25	7	15	32	7	71	39	7	127	—	—	183	—	—	239
25	8	16	32	8	72	39	8	128	—	—	184	—	—	240
26	1	17	33	1	73	40	1	129	—	—	185	—	—	241
26	2	18	33	2	74	40	2	130	—	—	186	—	—	242
26	3	19	33	3	75	40	3	131	—	—	187	—	—	243
26	4	20	33	4	76	40	4	132	—	—	188	—	—	244
26	5	21	33	5	77	40	5	133	—	—	189	—	—	245
26	6	22	33	6	78	40	6	134	—	—	190	—	—	246
26	7	23	33	7	79	40	7	135	—	—	191	—	—	247
26	8	24	33	8	80	40	8	136	—	—	192	—	—	248
27	1	25	34	1	81	41	1	137	—	—	193	—	—	249
27	2	26	34	2	82	41	2	138	—	—	194	—	—	250
27	3	27	34	3	83	41	3	139	—	—	195	—	—	251
27	4	28	34	4	84	41	4	140	—	—	196	—	—	252
27	5	29	34	5	85	41	5	141	—	—	197	—	—	253
27	6	30	34	6	86	41	6	142	—	—	198	—	—	254
27	7	31	34	7	87	41	7	143	—	—	199	—	—	255
27	8	32	34	8	88	41	8	144	—	—	200	—	—	256
28	1	33	35	1	89	42	1	145	—	—	201			
28	2	34	35	2	90	42	2	146	—	—	202			
28	3	35	35	3	91	42	3	147	—	—	203			
28	4	36	35	4	92	42	4	148	—	—	204			
28	5	37	35	5	93	42	5	149	—	—	205			
28	6	38	35	6	94	42	6	150	—	—	206			
28	7	39	35	7	95	42	7	151	—	—	207			
28	8	40	35	8	96	42	8	152	—	—	208			
29	1	41	36	1	97	43	1	153	—	—	209			
29	2	42	36	2	98	43	2	154	—	—	210			
29	3	43	36	3	99	43	3	155	—	—	211			
29	4	44	36	4	100	43	4	156	—	—	212			
29	5	45	36	5	101	43	5	157	—	—	213			
29	6	46	36	6	102	43	6	158	—	—	214			
29	7	47	36	7	103	43	7	159	—	—	215			
29	8	48	36	8	104	43	8	160	—	—	216			
30	1	49	37	1	105	44	1	161	—	—	217			
30	2	50	37	2	106	44	2	162	—	—	218			
30	3	51	37	3	107	44	3	163	—	—	219			
30	4	52	37	4	108	44	4	164	—	—	220			
30	5	53	37	5	109	44	5	165	—	—	221			
30	6	54	37	6	110	44	6	166	—	—	222			
30	7	55	37	7	111	44	7	167	—	—	223			
30	8	56	37	8	112	44	8	168	—	—	224			

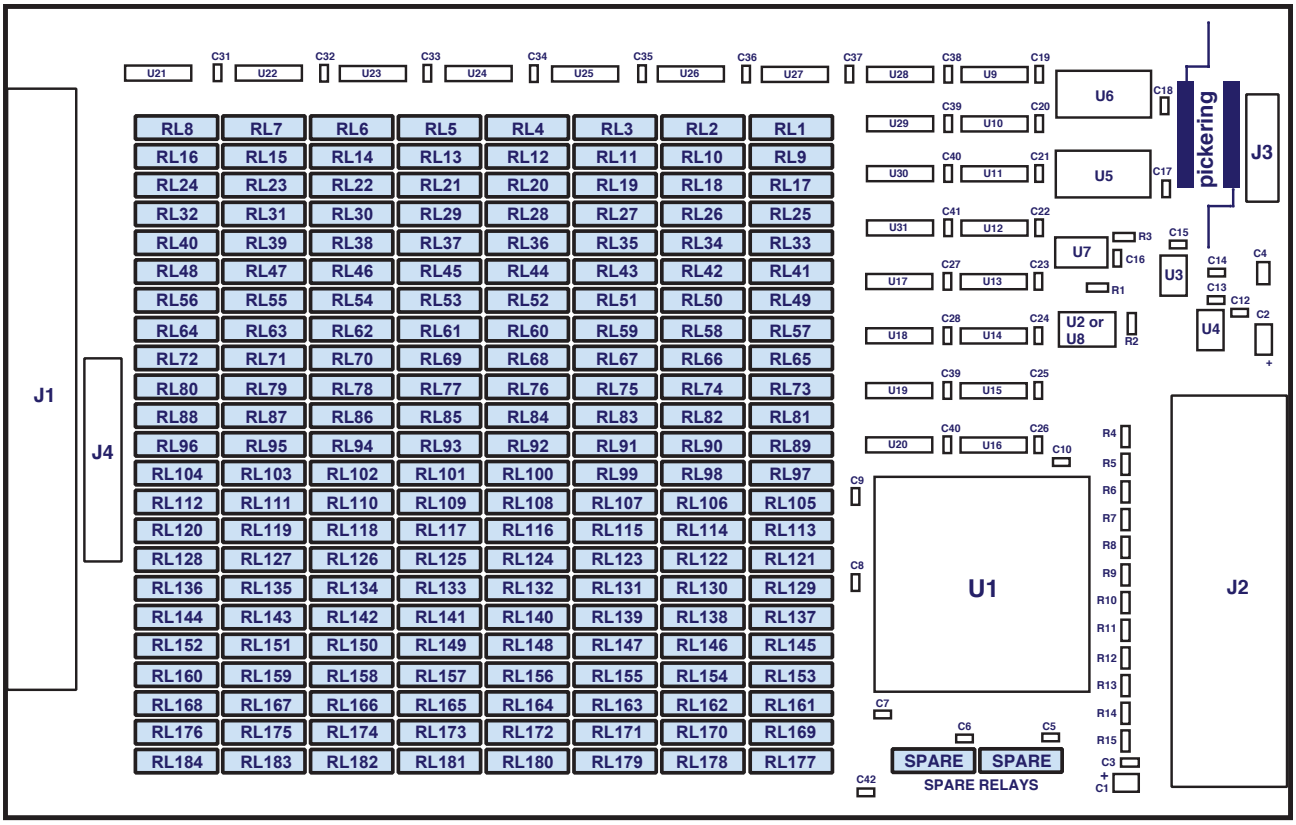


Figure 7.5 - 40-537 Ultra High Density Matrix Module Motherboard Layout

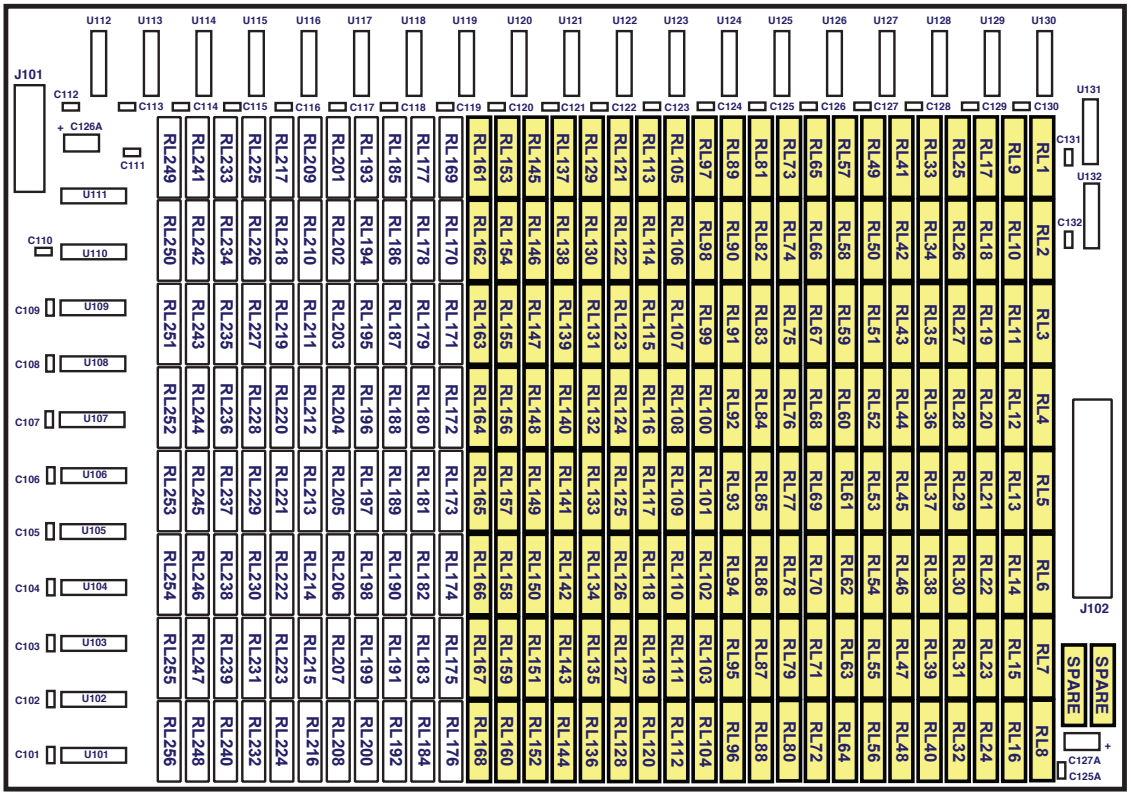


Figure 7.6 - 40-537 Ultra High Density Matrix Module Daughterboard Layout

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