PXI Ultra High Density Matrix Module



PXI

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FM38792

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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.	

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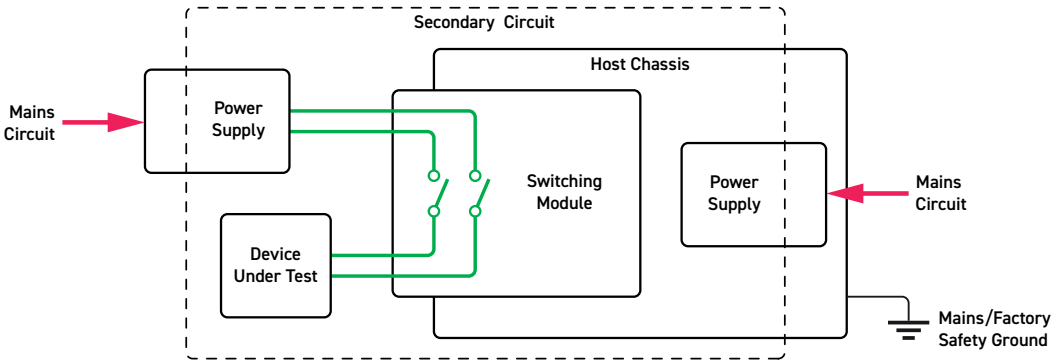
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Warnings & Cautions

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 PXI/PXIe/LXI 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 300 V. 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: • 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. • 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. • Outer clothing worn must be unable to generate static charges. • 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 With 256 Crosspoints
- 1-Pole 32x8 Matrix
- 1-Slot PXI (CompactPCI) Module
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <1000 µs
- Switch up to 150 V with 20 W Max Power
- Max Current 1 A Cold or Hot Switching
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by *eBIRST* ™
- 3 Year Warranty



The 40-530 is a very high density matrix in single slot PXI format. It has 256 crosspoints configured as a 32x8 single pole matrix.

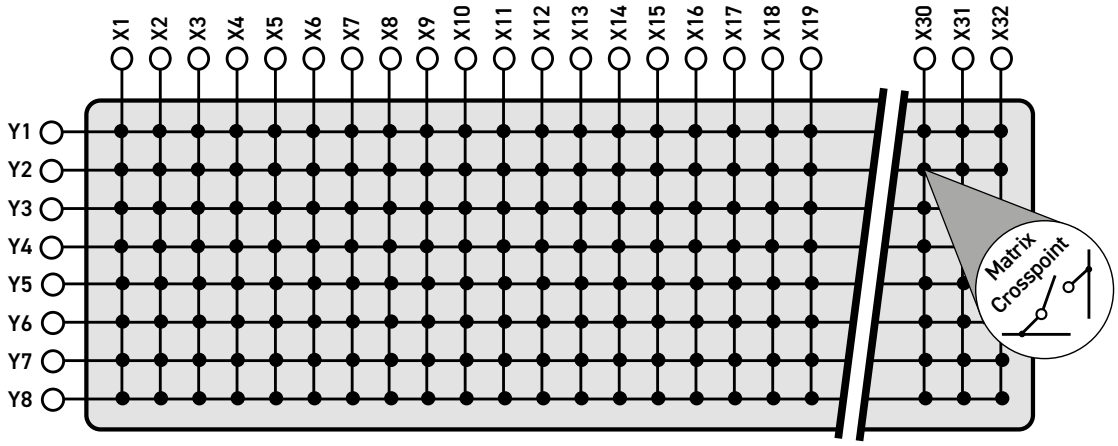
Typical applications include signal routing in Functional ATE and data acquisition systems. The modules are constructed using high reliability sputtered ruthenium reed relays, offering 10^9 operations to give maximum switching confidence with long life and stable contact resistance.

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



40-530 Single Pole 32x8 Matrix

Section 1 - Technical Specification

Relay Type

The 40-530 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 Relays 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:	150 VDC/100 VAC
Max Power:	20 W
Max Switch Current:	1.0 A
Max Carry Current:	1.0 A
Initial Path Resistance	
On (Single Module):	<500 mΩ
Off (Single Module):	>10^9 Ω
Operate Time:	<1 ms, 0.5 ms typical
Release Time:	<1 ms, 0.5 ms 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.

RF Specification - In a 50 Ω System

Bandwidth (-3 dB):	30 MHz	(40-530-021)
Crosstalk (typical):	10 kHz:	-90 dB
	100 kHz:	-65 dB
	1M Hz	-35 dB
	10 MHz:	-24 dB
	25 MHz	-23 dB
	50 MHz	-19 dB
Isolation (typical):	10 kHz:	90 dB
	100 kHz:	85 dB
	1 MHz	70 dB
	10 MHz:	51 dB
	25 MHz	37 dB
	50 MHz	21 dB

Power Requirements

+3.3 V	+5 V	+12 V	-12 V
0	1 A (typ 280 mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
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 1.27 mm pitch 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:	5000 m

Storage and Transport Conditions

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

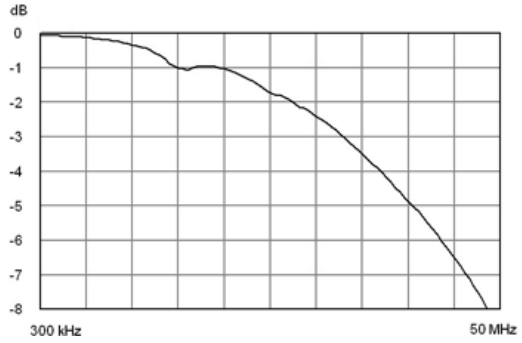
PXI & CompactPCI Compliance

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

Uses a 33 MHz 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.



Insertion Loss Plot For 40-530-021 (typical worst case)

Section 1 - Technical Specification

Product Order Codes

Single 32x8 Matrix Module, 1-Pole	40-530-021

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
40-530	93-002-001	93-002-226	93-016-103

Spare Relay Kits

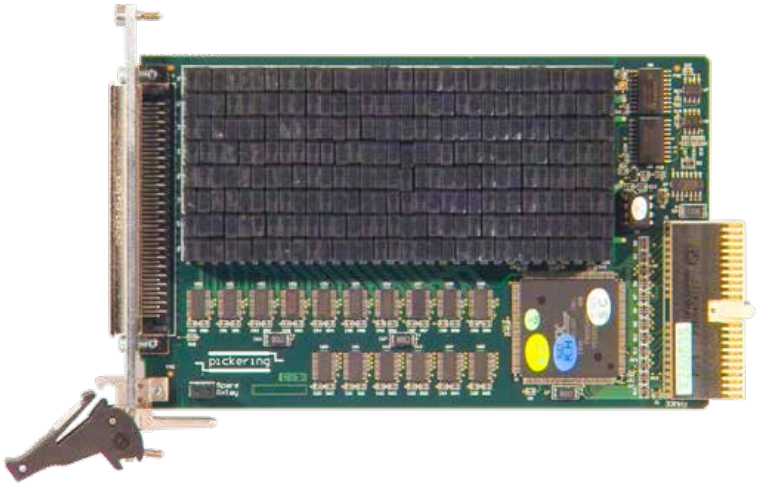
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-530	91-100-019

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

Mating Connectors & Cabling

For connection accessories for the 40-530 module please refer to the 90-016D 96-pin 1.27 mm pitch Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the website



PCB View of the 40-530 Ultra High Density Matrix Module

The 40-530 is part of a range modules suitable for switching applications that require a high density matrix.

Pickering's Range of PXI High Density Reed & Solid-state Matrix Modules			
Matrix Configuration	Max Switch Voltage	Max Switch/ Carry Current	Model No.
64x4, 1-pole (Solid-state)	60 V	500 mA	40-500
64x4, 1-pole (Solid-state)	100 V	150 mA	40-501
32x8, 1-pole (Reed)	150 VDC/100 VAC	1 A/1 A	40-530
32x8 or Dual 16x8, 1-pole or 2-pole (Reed)	150 VDC/100 VAC	0.5 A/0.5 A	40-531/532
64x4 or 64x2, 1-pole or 2-pole (Reed)	150 VDC/100 VAC	1 A/1 A	40-533B
Dual 32x4, 1-pole or 2-pole (Reed)	150 VDC/100 VAC	0.5 A/0.5 A	40-534A
92x4, 44x8 or Dual 44x4, 1-pole (Reed)	150 VDC/100 VAC	0.5 A/0.5 A	40-535/536/537
55x8, 1-pole (Reed)	150 VDC/100 VAC	0.5 A/0.5 A	40-538
132x4, 66x8 or 33x16, 1-pole (Reed)	150 VDC/100 VAC	0.5 A/0.5 A	40-540A/541A/524A





Functional Description

A functional block diagram is provided in Figure 2.1. The Ultra High Density Matrix Module is powered by a +5 V input via Compact PCI connector J1. The interface to the user test equipment is via the front panel mounted 96-pin 1.27 mm pitch 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.

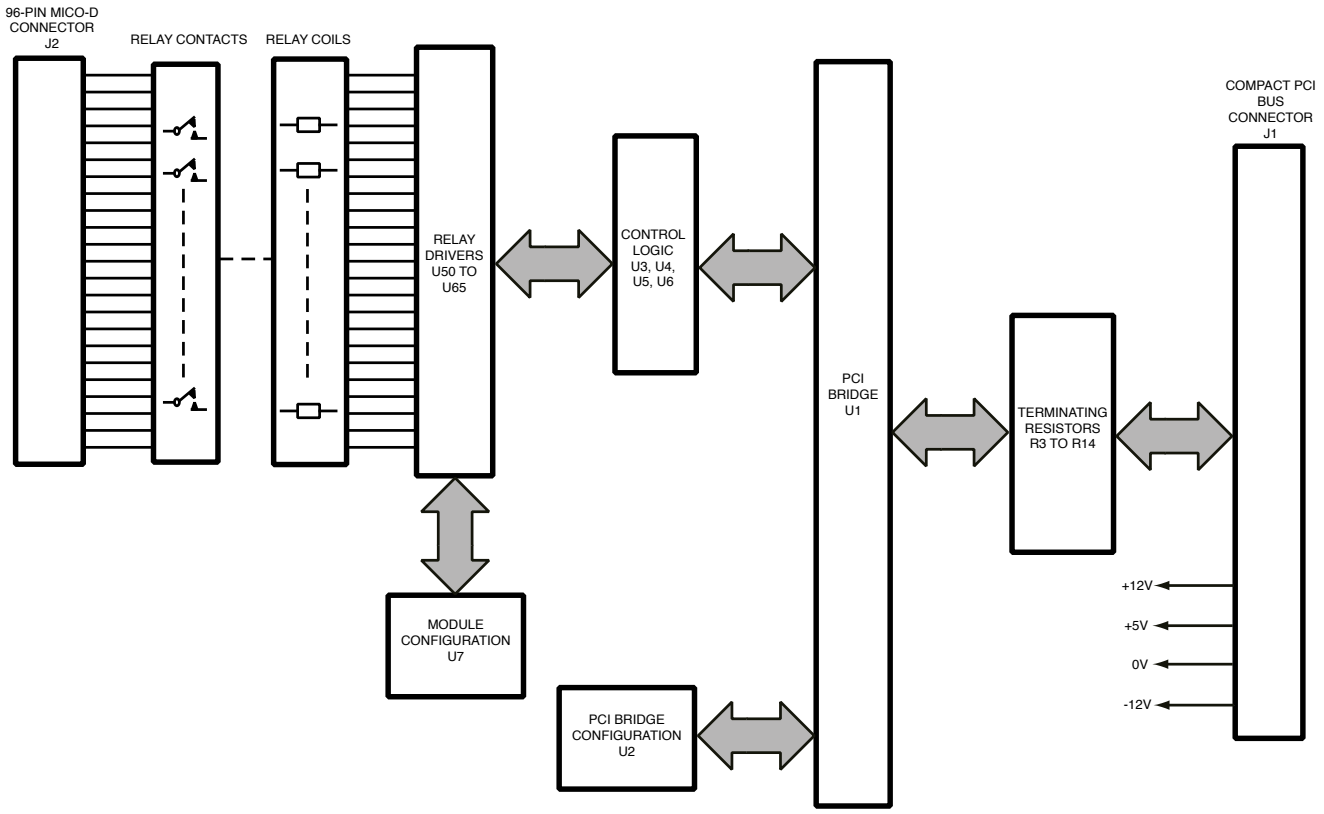


Figure 2.1 - Ultra High Density Matrix Module (40-530-021): Functional Block Diagram

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.

Pre-operation 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.

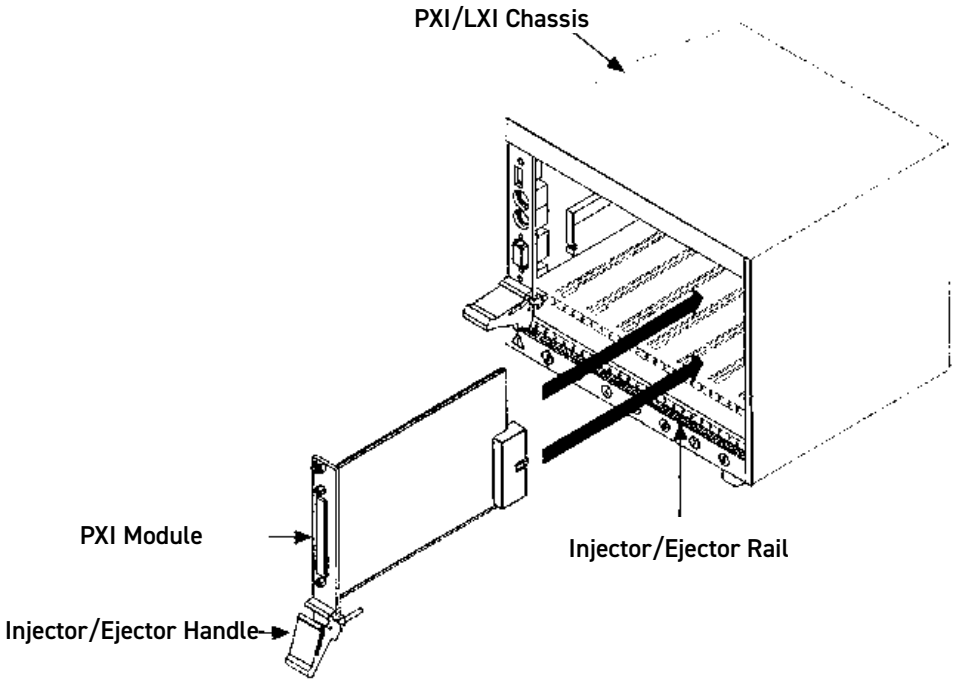


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

Hardware Installation Electrical Connection (Chassis)

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

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 vi.

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 Pickering switching and simulation PCI, PXI and PXIe products.

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.

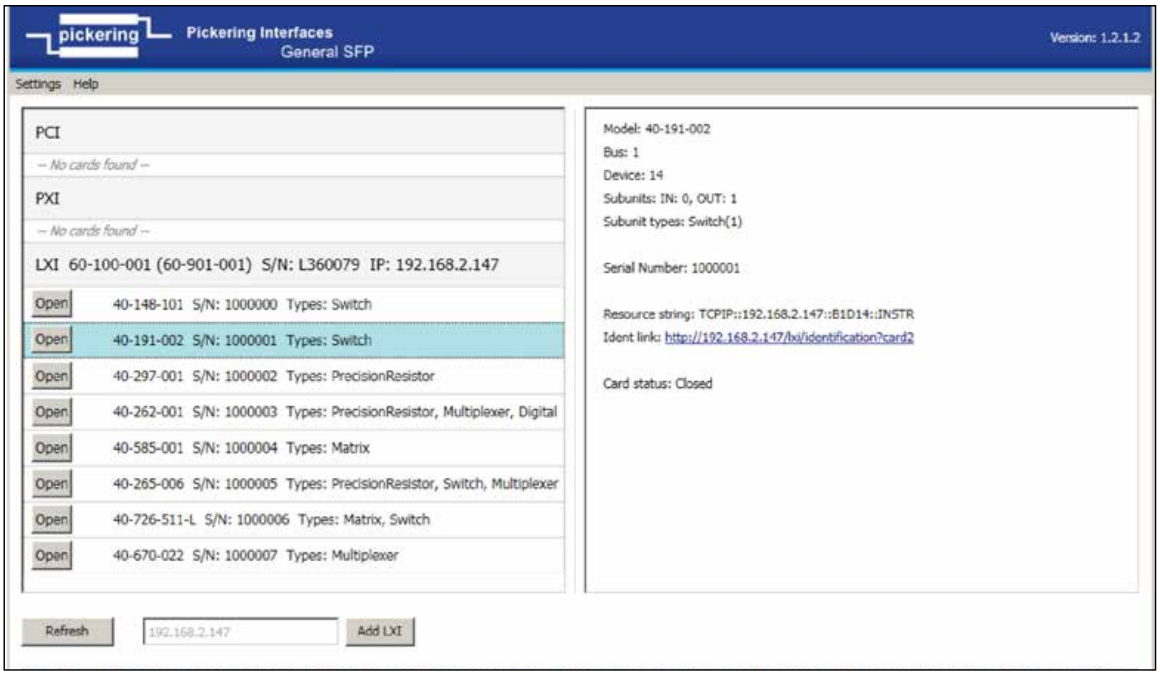


Figure 3.3 - General Soft Front Panel Selector

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

Section 4 - Programming

Programming options for Pickering Interfaces PXI Modules

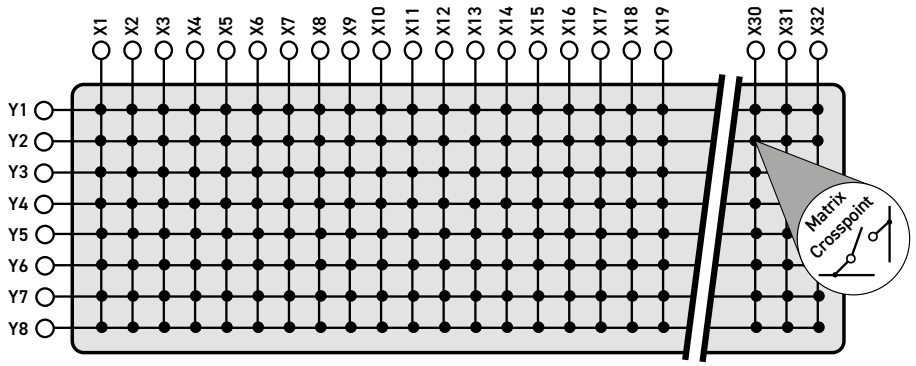
For information on the installation and use of drivers and the programming of Pickering's products in various software environments, please refer to the Software User Manual.

This is available as a download from:
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 40-530 is a single 1-pole switching matrix with 32 connections on the X-axis and 8 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 matrix architecture is shown in the diagram below:



40-530-021 Single 32x8 1-Pole Matrix

The entire matrix is treated as a single programming sub-unit designated as Sub-Unit 1. The following page gives some simple examples using the provided drivers: the IVI driver, the Direct I/-O driver, and the IVI compliant driver.

Programming The Module

Using The IVI Driver, Direct 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:

```
pi40iv_Connect(vi, "x1", "y2");    //set crosspoint x1, y2 to on
pi40iv_Disconnect(vi, "x1", "y2");//set crosspoint x1, y2 to off
```

Using the Pickering Direct I/O driver:

```
DWORD SubUnit = 1;
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;
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
```

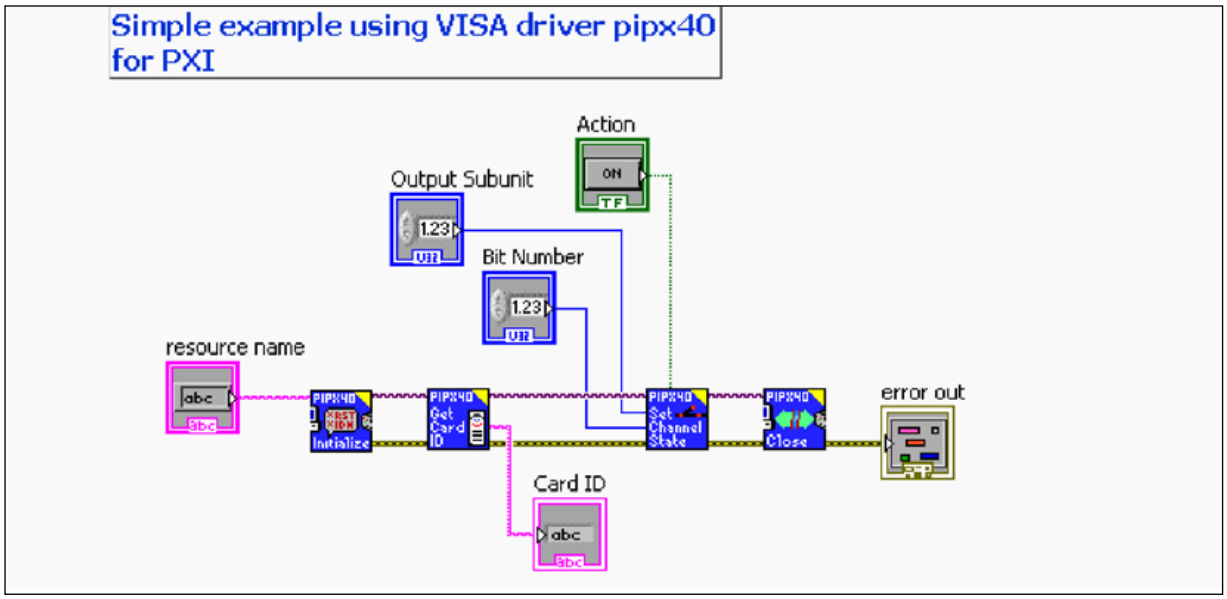
Using Pickering Drivers In LabVIEW

Most Pickering drivers include a LabVIEW wrapper to permit full operation of the Pickering product from the LabVIEW environment. These wrappers are normally installed to the current LabVIEW folder system during installation of the Pickering driver.

The process of controlling a Pickering product normally consists of the following steps:

1. Open a control session on the product.
2. Use functions in the library to operate the product.
3. Close the control session.

Following is a simple example of the use of the most common Pickering drivers:



Example Use of Pickering Drivers in LabVIEW

To download LabVIEW examples, please go to:

Using Pickering Drivers in LabVIEW

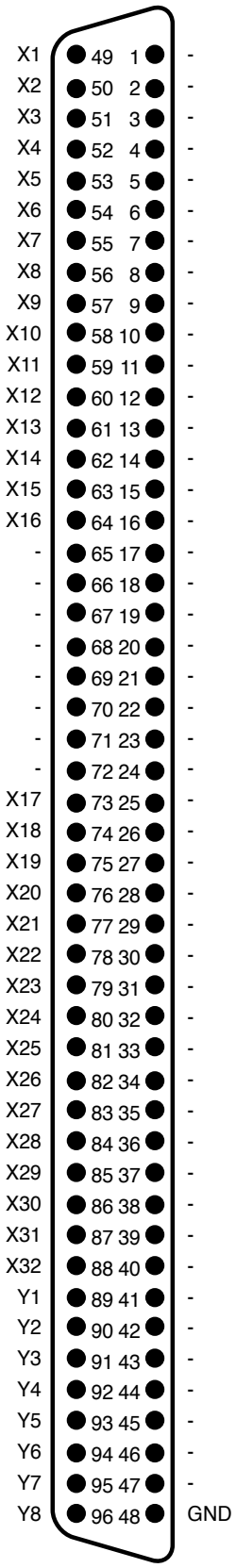


Figure 5.1 - Pinout: 40-530-021 32x8 Ultra High Density Matrix Module (96-pin male 1.27 mm pitch connectorviewed from front of module)

Section 6 - Troubleshooting

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.

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 visit: pickeringtest.com/ebirst

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.

TABLE 7.1 - Ultra High Density Matrix 40-530-021 Relay Numbering

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	RL1	1	2	RL33	1	3	RL65	1	4	RL97
2	1	RL2	2	2	RL34	2	3	RL66	2	4	RL98
3	1	RL3	3	2	RL35	3	3	RL67	3	4	RL99
4	1	RL4	4	2	RL36	4	3	RL68	4	4	RL100
5	1	RL5	5	2	RL37	5	3	RL69	5	4	RL101
6	1	RL6	6	2	RL38	6	3	RL70	6	4	RL102
7	1	RL7	7	2	RL39	7	3	RL71	7	4	RL103
8	1	RL8	8	2	RL40	8	3	RL72	8	4	RL104
9	1	RL9	9	2	RL41	9	3	RL73	9	4	RL105
10	1	RL10	10	2	RL42	10	3	RL74	10	4	RL106
11	1	RL11	11	2	RL43	11	3	RL75	11	4	RL107
12	1	RL12	12	2	RL44	12	3	RL76	12	4	RL108
13	1	RL13	13	2	RL45	13	3	RL77	13	4	RL109
14	1	RL14	14	2	RL46	14	3	RL78	14	4	RL110
15	1	RL15	15	2	RL47	15	3	RL79	15	4	RL111
16	1	RL16	16	2	RL48	16	3	RL80	16	4	RL112
17	1	RL17	17	2	RL49	17	3	RL81	17	4	RL113
18	1	RL18	18	2	RL50	18	3	RL82	18	4	RL114
19	1	RL19	19	2	RL51	19	3	RL83	19	4	RL115
20	1	RL20	20	2	RL52	20	3	RL84	20	4	RL116
21	1	RL21	21	2	RL53	21	3	RL85	21	4	RL117
22	1	RL22	22	2	RL54	22	3	RL86	22	4	RL118
23	1	RL23	23	2	RL55	23	3	RL87	23	4	RL119
24	1	RL24	24	2	RL56	24	3	RL88	24	4	RL120
25	1	RL25	25	2	RL57	25	3	RL89	25	4	RL121
26	1	RL26	26	2	RL58	26	3	RL90	26	4	RL122
27	1	RL27	27	2	RL59	27	3	RL91	27	4	RL123
28	1	RL28	28	2	RL60	28	3	RL92	28	4	RL124
29	1	RL29	29	2	RL61	29	3	RL93	29	4	RL125
30	1	RL30	30	2	RL62	30	3	RL94	30	4	RL126
31	1	RL31	31	2	RL63	31	3	RL95	31	4	RL127
32	1	RL32	32	2	RL64	32	3	RL96	32	4	RL128

TABLE 7.1 - Ultra High Density Matrix 40-530-021 Relay Numbering (Continued)

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	5	RL129	1	6	RL161	1	7	RL193	1	8	RL225
2	5	RL130	2	6	RL162	2	7	RL194	2	8	RL226
3	5	RL131	3	6	RL163	3	7	RL195	3	8	RL227
4	5	RL132	4	6	RL164	4	7	RL196	4	8	RL228
5	5	RL133	5	6	RL165	5	7	RL197	5	8	RL229
6	5	RL134	6	6	RL166	6	7	RL198	6	8	RL230
7	5	RL135	7	6	RL167	7	7	RL199	7	8	RL231
8	5	RL136	8	6	RL168	8	7	RL200	8	8	RL232
9	5	RL137	9	6	RL169	9	7	RL201	9	8	RL233
10	5	RL138	10	6	RL170	10	7	RL202	10	8	RL234
11	5	RL139	11	6	RL171	11	7	RL203	11	8	RL235
12	5	RL140	12	6	RL172	12	7	RL204	12	8	RL236
13	5	RL141	13	6	RL173	13	7	RL205	13	8	RL237
14	5	RL142	14	6	RL174	14	7	RL206	14	8	RL238
15	5	RL143	15	6	RL175	15	7	RL207	15	8	RL239
16	5	RL144	16	6	RL176	16	7	RL208	16	8	RL240
17	5	RL145	17	6	RL177	17	7	RL209	17	8	RL241
18	5	RL146	18	6	RL178	18	7	RL210	18	8	RL242
19	5	RL147	19	6	RL179	19	7	RL211	19	8	RL243
20	5	RL148	20	6	RL180	20	7	RL212	20	8	RL244
21	5	RL149	21	6	RL181	21	7	RL213	21	8	RL245
22	5	RL150	22	6	RL182	22	7	RL214	22	8	RL246
23	5	RL151	23	6	RL183	23	7	RL215	23	8	RL247
24	5	RL152	24	6	RL184	24	7	RL216	24	8	RL248
25	5	RL153	25	6	RL185	25	7	RL217	25	8	RL249
26	5	RL154	26	6	RL186	26	7	RL218	26	8	RL250
27	5	RL155	27	6	RL187	27	7	RL219	27	8	RL251
28	5	RL156	28	6	RL188	28	7	RL220	28	8	RL252
29	5	RL157	29	6	RL189	29	7	RL221	29	8	RL253
30	5	RL158	30	6	RL190	30	7	RL222	30	8	RL254
31	5	RL159	31	6	RL191	31	7	RL223	31	8	RL255
32	5	RL160	32	6	RL192	32	7	RL224	32	8	RL256

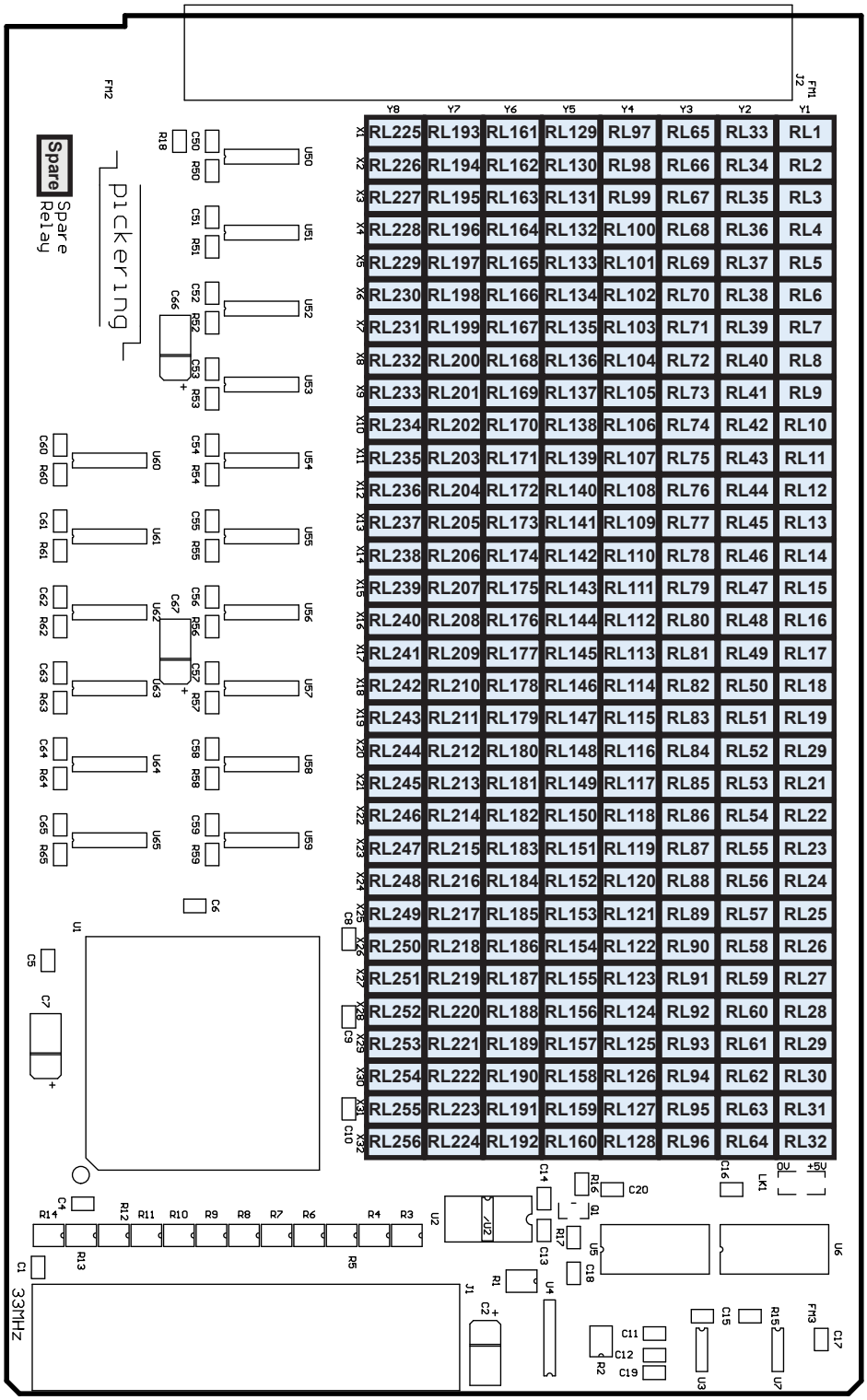


Figure 7.1 - 40-530 Ultra High Density Matrix Module Component Layout